

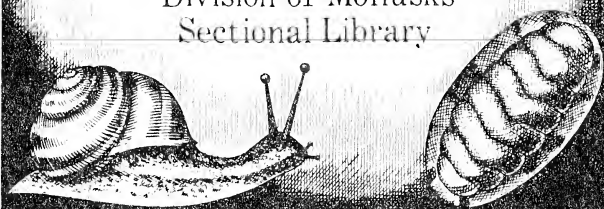
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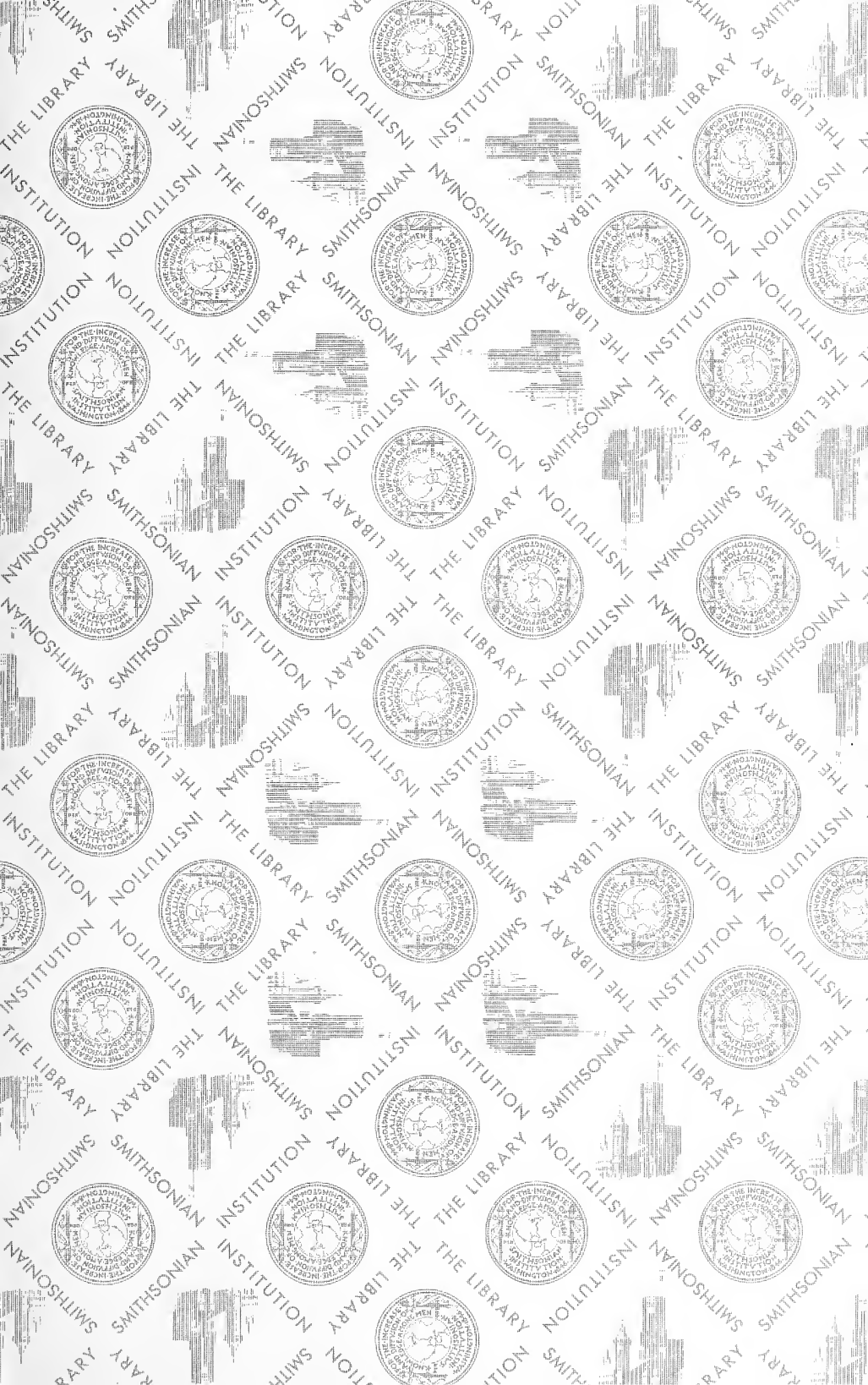
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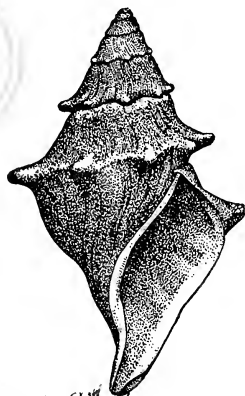
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ANNUAL REPORTS
for 1962



cl. 284

A.M.U., Twenty-ninth Annual Meeting
A.M.U., P.D., Fifteenth Annual Meeting



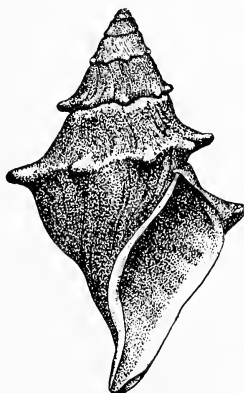
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ANNUAL REPORTS
for 1962



A.M.U., Twenty-ninth Annual Meeting
A.M.U., P.D., Fifteenth Annual Meeting

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Bulletin number 29, December 1, 1962. Issued annually by the American Malacological Union. Editorial Board: Morris K. Jacobson, Publications Editor, and Margaret C. Teskey, Secretary. Office of publication: Route 2, Box 318, Marinette, Wisconsin.

AMERICAN MALACOLOGICAL UNION TWENTY-NINTH ANNUAL MEETING

**St. Petersburg, Florida
July 31 - August 3, 1962**

For the second time in its history the American Malacological Union accepted an invitation to hold the annual meeting in St. Petersburg, Florida. As had been the case in 1936, members from near and far came, saw and were conquered by the gracious hospitality of their hosts who, on this occasion, were the St. Petersburg Shell Club and Florida Presbyterian College. The former group was unflagging in its efforts to ensure a flawless meeting while the college provided that winning combination, the opportunity to meet, eat and sleep beneath one roof.

When in March details of the planned midsummer meeting were made public, the small item promising air-conditioned meeting and sleeping rooms seemed unimportant. It was a very different story as one hot and humid day followed another; only real necessity took one beyond the comfort zone, thus the needed rain which fell for most of the second and third day caused little inconvenience beyond temporary postponement of the group photograph.

Tuesday, opening day, began with registration which took up the early hours. By noon at least one hundred persons wore the familiar name badges, and those who drifted in during the following three days swelled the attendance total to 145, the second largest crowd in AMU history.

At two o'clock the twenty-ninth annual meeting was formally opened by President William K. Emerson, who introduced the President of the St. Petersburg Shell Club, Miss Dorothy E. Hanssler. On behalf of her club President Hanssler extended a cordial welcome to the assembled guests. She then presented the Honorable Herman Goldner, Mayor of St. Petersburg.

Mayor Goldner confessed that although pronunciation of the word malacological gave him some trouble, he desired to heartily second Miss Hanssler's welcome. "Ours is a friendly city, and we shall be hurt if you do not enjoy our facilities to the utmost." He urged his listeners to visit the nearby Marine Research Fisheries Laboratory, adding that he personally finds the idea of undersea exploration as exciting as the current space travels. Plans are under way, said he, to develop in St. Petersburg a marine biological laboratory to compare with those operating on the Atlantic and Pacific coasts. "We now are open to suggestions, later we will need your support."

He then introduced Dr. John M. Bevan, Dean of the Faculty, Florida Presbyterian College.

Dr. Bevan expressed regret that the AMU members were a few short weeks too early to enjoy the facilities of the new dormitories, for the college is to move to new and permanent quarters in time for the Fall term. "It will be revolutionary, for ours is a completely new departure in imparting knowl-

edge," said he. "Based on a tested program of independent study, we allow our students to set and to follow their own pace. Our faculty is expected to supervise as the student dredges up his own facts rather than absorbing them through classroom lectures. Our library is in constant use rather than being merely a quiet place to study." Dr. Bevan also invited AMU members to visit the Fisheries and Conservation laboratories, and at a later date to return and visit the college on the new campus.

President Emerson replied for his fellow members that the present facilities were quite ample. "We are grateful to the College for being allowed to use them, and to the St. Petersburg Shell Club for inviting us here. It is a real pleasure to find beaches covered with shells instead of mosquitos, in this place where the beachcombers advance to become malacologists. Here there is something of interest for everyone, and I'm sure that we have a fine meeting ahead of us."

He then introduced the first paper:

SHELLS OF TAMPA BAY. Lulu B. Seikman, St. Petersburg, Florida.

(Abstract)

Tampa Bay is bounded on the west by St. Petersburg, on the north by Safety Harbor, on the east by the city of Tampa, and on the south by Anna Maria Island and the Gulf of Mexico. There are 212 miles of coastline and the total area covers 318 square miles. The depth ranges from 0 to 30-36 feet deep in the ships' channel. The deepest part is a natural depth of 93 feet at the mouth of the bay between Egmont Key and Mullet Key where the Bay and the Gulf of Mexico meet. The water temperature ranges from 67 to 68 degrees Fahrenheit in the winter to 90 degrees in the summer. The water salinity at the mouth of Tampa Bay at Egmont Key is 35-36 parts salt to 1,000 parts water. It varies near the mouth of rivers such as the Hillsborough River and during the rainy season. The bay has a varied ecology: mucky mud, sandy mud, sand, intertidal sandbars, oyster bars (many on lease to local oyster men) and some coral rocks. There are many species of marine plant life: algae, codium, caulerpa and even Sargassum weed that floats in after a storm. Mangrove bushes grow close to the shoreline and also form islands. Fossils are mixed with dead Recent shells. There are approximately 300 species of molluscan life in the water as well as a rich and varied fauna of other forms of sea life.

(Discussion)

Emerson: "How many species do you estimate are to be found in this area?" Seikman: "Better than three hundred." Jacobson: "As to those variations in *Melongena*: are they constant throughout any one colony, or do they occur as individuals throughout the species?" Seikman: "Minor variations seem to be fairly constant in each colony."

Mrs. Seikman's paper was illustrated by the first of several series of magnificent color slides made by Mr. Dan Steger, a member of the St. Petersburg Shell Club. Not only was his talent for fine photography ever more evident as the meeting progressed, he also manned the projector throughout the meeting.

LIVING MOLLUSKS PHOTOGRAPHED BY THEOPHIL KUCZYNSKI.

Florence Kuczynski, St. Petersburg, Florida.

The talent of the late Mr. Kuczynski for fine nature photography has been demonstrated at earlier AMU meetings. This series of color slides of living mollusks and other creatures of the sea presented studies of the animals which the casual collector seldom sees.

MUSSEL DISTRIBUTION IN RELATION TO STREAM CONFLUENCE IN NORTHERN MICHIGAN. Henry van der Schalie, University of Michigan. Read by George M. Davis.

(Abstract)

The presence of certain southern Michigan freshwater mussels, such as *Alasmidonta marginata* (Say), *Elliptio dilatatus* (Raf.) and *Lasmigona costata* (Raf.), in northern Michigan rivers (the Millecoquin, Carp and Ocqueoc) indicates that these rivers formerly must have been connected in a continuous dendritic river pattern. At present these species have a *discontinuous* pattern of distribution. The extension of their ranges and their present distribution can be accounted for best by evidence adduced by glacial geologists who indicated a former Mackinac River occupied the bed of northern Lake Michigan during a low water stage in postglacial (Chippewa-Stanley) time—approximately 8,500 years ago. While the above three Mississippi species traveled north and eastward along this route, an Atlantic species, *Elliptio complanatus* (Dillwyn), apparently reached the Ocqueoc River in northern Lower Michigan moving westward when these confluences existed. The information bearing on these extensions of ranges also substantiates confluences indicated previously for the region of the Fox River of Wisconsin and Green Bay.

(Discussion)

Jacobson: "Herb Athearn and I found *Elliptio complanatus* on the East Coast only in ocean-emptying streams, never in those of the Mississippi drainage." Morrison: "True; *complanatus* is an Atlantic species with a peculiar northern distribution, limited to certain parts of the Great Lakes. *Elliptio dilatatus* is predominant in the Fox River because in glacial times this river was the outlet of Green Bay into the Wisconsin and the Mississippi. Also, in 1934 I took mussels of Mississippi Drainage species in Jackson Park, Chicago; *Actinonaias ligamentina* was large and fine there. I'll hazard a guess that it still lives in Lake Michigan."

* * *

This paper concluded the opening day session. At 6:30 everyone was transported in a chartered bus to the Police Pistol Club House, there as guests of the St. Petersburg Shell Club to partake of what had been billed as "An Old-fashioned Southern Fish Fry." Fried mullet, hominy grits, salad and hush puppies were eaten with gusto, topped off with a choice of desserts reminiscent of church suppers featuring the best culinary efforts of the lady members. In reply to President Emerson's spoken appreciation, Miss Hansler explained that all credit was due the members of the Skyway Outboard

Association who had planned, prepared and served the unusual meal. The St. Petersburg Shell Club had merely picked up the check.

Wednesday morning ushered in a violent electrical storm which continued on as an all-day rain. All was snug within, however, and at nine o'clock Dr. Emerson introduced the day's first speaker:

SMALL BEGINNINGS. Adlai H. Wheel, Syracuse Boys' Club, Syracuse, New York.

Mr. Wheel's message was familiar, yet ever new. "Encourage the boy who shows interest; every one of our great scientists was once a child with the desire to learn. Yours may be the encouragement which decides the fate of the scientist of the future." Mr. Wheel displayed some of the visual aids used to instruct members of his boys' club in nature studies.

A THEORETICAL MODEL FOR MEASURING SECONDARY PRODUCTIVITY IN MOLLUSKS.¹ George M. Davis, Museum of Zoology, University of Michigan.

(Abstract)

Secondary productivity is the rate of incorporation of energy into protoplasm in herbivores. The snails *Pomatiopsis lapidaria* and *P. cincinnatiensis* are well suited for determining secondary productivity in a segment of a terrestrial community.

Growth and development in each snail per unit time results from the net energy available when energy lost from the snail via feces, nitrogenous waste, and respiration is subtracted from the energy gained upon ingestion of food.

Observations showed that energy lost in the feces could be quantified because the fecal material was regularly voided in uniform, discrete units termed "fecal pellets." That considerable units of energy are present in fecal material was shown by culturing many species of blue-green algae and diatoms from surgically removed fecal material. Spectrophotometric techniques can probably be used to quantify nitrogenous waste material voided by the snails when the snails are placed in water.

A variety of physiological apparatus is available for measuring the oxygen consumption of small organisms thereby determining the energy lost in metabolism.

Quantification of ingested food particles was made possible as follows: snails were allowed to graze on a uni-algal culture of diatoms labeled with C¹⁴. The radioactivity per each diatom cell was calculated. At the end of a given feeding period the radioactivity per each snail was determined and this was directly correlated with the number of diatom cells ingested.

The energetic level of the protoplasm of the diatoms and snails as well as the energy of the organic matter in the feces can be determined by means of a micro bomb calorimeter.

Since the clock was racing, there was no discussion of this paper.

¹ This work was supported by a contract with the U.S. Army Medical Research and Development Command and sponsored by the Commission on Parasitic Disease, Armed Forces Epidemiological Board.

COMPARATIVE GENERIC AFFINITIES OF THE SPHAERIID CLAM
GENUS *EUPERA* BOURGUIGNAT, 1854.¹ William H. Heard,² Museum
of Zoology, University of Michigan.

(Abstract)

Eupera cubensis (Prime) was compared anatomically to *Sphaerium striatum* (Lamarck), *S. sulcatum* (Lamarck), *Musculium lacustre* (Müller), *M. transversum* (Say), *Pisidium* (*Pisidium*) *amnicum* (Müller), *P. (P.) dubium* (Say), *P. (Galilea) compressum* Prime, *P. (G.) nitidum* Jenyns, and *P. (Neopisidium) conventus* Clessin.

The dorsal lobes of the nephridia of *Eupera* are elongated and deeply cleft as in *Sphaerium*, *Musculium* and *Pisidium* s. str. The gills in *Eupera*, like those of *Sphaerium*, *Musculium* and *Pisidium* s. s., consist of a large anterior (inner) pair slightly overlapped in the rear by a large posterior (outer) pair, both pairs being composed of inner and outer lamellae. The siphons of *Eupera*, however, are unlike those of any other sphaeriid clam: two well-developed, completely separated siphons (not even partially fused as in *Sphaerium*) which evidently can extend and retract independently.

(Discussion)

Thompson: "Where does *Pisidium* fit in the evolution of the family Sphaeriidae—is it primitive?" Heard: "Odner's published accounts suggest what he referred to as "regressive evolution," or the progressive loss of certain anatomical features such as gills and siphons. So the more simply organized sphaeriid clams such as *Pisidium* would be considered as most advanced." Morrison: "Evolution in the group has taken place, at least in part, through the reduction of two siphons in *Sphaerium* and *Musculium* to one in *Pisidium*. It is logical to assume that *Pisidium* has discarded the branchial siphon from lack of use." Heard: "The numbers of siphons and gills in *Sphaerium*, *Musculium* and *Pisidium* certainly support the concept of regressive evolution, ending in the culmination of *Pisidium*. Furthermore, Odner has briefly indicated that the nephridia of *Pisidium* (*Neopisidium*) *conventus* Clessin corresponds to an early embryonic stage in the development of the kidneys of *Musculium lacustre* (Müller). On the other hand, detailed observations on the life histories of representative members of each genus suggest that evolution proceeded to the *Sphaerium*-*Musculium* (and *Eupera*?) complex from *Pisidium*. There is some evidence at present which implies that life histories of sphaeriid clams are geographical (latitudinal) in nature and may eventually have to be discarded as a taxonomic criterion. Further life history data are required."

WATER IN MANTLE CAVITY OF LAND SNAILS. Walter C. Blinn,
Michigan State University, Lansing, Michigan.

(Abstract)

Activity-correlated weight fluctuations like those observed in *Helix pomatia* Linnaeus, *Arion ater* (Linnaeus), and *Limax flavus* Linnaeus by

¹This investigation was supported (in part) by research grant 2E-41 from the National Institute of Allergy and Infectious Diseases, U.S. Public Health Service.

²Present address: Department of Biological Sciences, Florida State University, Tallahassee, Florida.

Howes and Wells (1934, J. Exp. Biol., 11:327-351) also occur in *Mesodon thyroidus* (Say), *Allogona profunda* (Say), *Triodopsis albolabris* (Say), *Triodopsis notata* (Deshayes), *Triodopsis multilineata* (Say), *Anguispira alternata* (Say), *Helix aperta* Born, and *Otala lactea* Müller. In these species, roughly half of total daily weight variation exhibited in the laboratory is caused by variation in quantity of a fluid contained within the mantle cavity. This pallial water can be detected (1) through the shell of thin-shelled species by transmitted light or (2) when expelled through the pneumostome by animals stimulated to retract maximally.

Species for which no weight curves were obtained but which are known also to maintain pallial water are *Mesodon clausus* (Say) and *Eremina desertorum* (Forskål).

In laboratory animals, pallial water undergoes irregular cycles of diminishment and replenishment, its presence correlated with activity and its absence, with withdrawal (estivation). Experiments with *M. thyroidus* and *A. profunda* show that pallial water can be replenished from the body tissues as well as through the pneumostome. Its diminishment is apparently the result of absorption into the tissues.

All observations are consistent with the hypothesis that the mantle cavity, in addition to its function as a lung, serves as a reservoir in which water is stored when taken into the body in excess and from which water is drawn to bolster body hydration when desiccation exceeds water intake. From this postulate one might predict that there will be found habitat-related, inter-specific differences in the ability to maintain pallial water. In this connection, the only species examined that appear not to maintain pallial water are *Succinea ovalis* Say and *Stenotrema monodon* (Rackett), animals of wet habitats. However, too few animals were examined for this absence to be considered conclusive.

(Discussion)

Jacobson: "Was any chemical analysis made—was this water simple H₂O?" Blinn: "No analysis was made." Baker: "Have you worked with *Haplotrema concavum*?" Blinn: "No, but it might be interesting, considering the cannibalistic tendency of the species." Question: "Does *Helix pomatia* retain water in any quantity?" Blinn: "I haven't worked with that species."

THE SYSTEMATIC POSITION OF THE FAMILY CAECIDAE. Donald R. Moore, Institute of Marine Science, Miami, Florida.

(Abstract)

The Caecidae, a family of minute gastropods with slightly curved tubular shells, have been placed near the Vermetidae ever since William Clark published his views in 1855. As large numbers of *Caecum* were found in the shallow meadows of turtle grass, *Thalassia testudinum*, this material was utilized for comparison with other supposedly closely related small gastropods in the Superfamily Cerithiacea. The animal of *Caecum* was, however, much more similar to that of the Rissoacea, and appeared to be most similar to the Vitrinellidae. In addition, the shells of the Family Ctilocent-

idae appear to be related to both the Caecidae and the Vitrinellidae. No close relationship between the Caecidae and Vermetidae or other Cerithiacea could be found, and both the Caecidae and Ctiloceratidae are thus removed from the Cerithiacea and placed in the Rissoacea.

(Discussion)

Morrison: "This is important fundamental work and more of the same is vitally needed. I agree that the transfer should be made to put *Caecum* in its proper taxonomic place."

SLUG SHELLS. Dee S. Dundee, Louisiana State University in New Orleans.

(No abstract submitted)

(Discussion)

Steger: "What is the life span of these slugs?" Dundee: "I really can't say, though a search of the literature might well answer your question." Baker: "I can't recall anything specific being published although I suppose the matter has been covered—somewhere."

Dr. Dundee said that she will be interested in examining formalin-fixed slugs from any locality.

COLLECTING FRESHWATER SHELLS IN FLORIDA. Richard I. Johnson, Harvard University, Cambridge, Massachusetts.

(Abstract)

Some 200 stations, 140 of which were positive, were made. Much of the negative information is also of value. Florida had suffered a severe drought in recent years, and many of the lakes we explored were from ten to twenty feet below normal levels; hence it was easy to tell with some certitude if shells were present. Some lakes have been poisoned with rotenone and similar chemicals to destroy the fauna so that they can be stocked with game fish. This has happened to Noonan's Lake at Gainesville and probably to Lake Dora, where only dead shells were found. While it is difficult to say how widespread this practice is, it is probably on the increase, and we are glad to have made this survey when we did. We did not find any shells in the Peace River at Arcadia where the water was low and shells were once abundant. Except for a few rivers on the West Coast where we found high water, the collecting was good and the disappointments few. It is impossible to estimate the number of shells that were boiled out or preserved in alcohol, but they number in the thousands, and will serve as the basis of a subsequent paper, in which some fifty names applied to the Florida Unionidae will have to be evaluated.

One of the more exciting experiences was the rediscovery of shells in the lower Satilla and St. Marys Rivers, where the expedition of the previous year had been unable to collect because of high water, and where the acidity of the water indicated molluscan life doubtful.

The expedition party, in addition to the Johnson family, also included Samuel L. H. Fuller, who had accompanied Dr. Clench and Kenneth J. Boss to Georgia last year.

Mr. Johnson together with his family had collected Unionidae en route to the meeting. He mentioned briefly some of the problems which beset shell collectors, especially collectors of land and freshwater species. Not the least of these is the curiosity of the uninformed onlooker. There are a number of answers to "What are you doing? Why do you want those clams—or those snails?" "For bait," is easily understood and usually serves to satisfy. "We sell them," may also serve but may lead to complications as the inquirer seeks to ascertain a market for his own future efforts. To say "We are collecting *Elliptio complanatus*!" will on occasion buy respectful silence. Best of all, said Mr. Johnson, was his young daughter's inspired rejoinder to a questioner: "I'm looking for their souls!"

Finally, said he, after one has collected en route and cooked out the daily take in motel rooms, it is well to select a wholly new set of motels on the return trip.

To occupy free time before the noon break, Dr. Emerson invited reports of any independent publications with representatives in the audience.

JOHNSONIA, said Dr. William J. Clench, has five papers nearly ready for publication, has been hampered of late by printer trouble.

Dr. R. Tucker Abbott reported that INDO-PACIFIC MOLLUSCA now has 800 subscribers, that four papers are in the making (including one on Conidae by Dr. Alan J. Kohn) and that the next to be released will cover Cassidae for which 16 colored plates are being processed in Japan.

Mrs. H. B. Baker, Business Manager for NAUTILUS said that though the staff works on a no-pay volunteer basis it is a constant struggle to keep publication costs within the present subscription rates. One source of revenue has been the sale of back issues. She urged her listeners (and readers) to send in any copies of whatever date which are no longer valued as reference material. "We will pay something for them if you wish, but in any case you will be doing us all a great favor by enabling us to assemble sets for sale."

Dr. J. B. Burch of the University of Michigan announced the founding of a new malacological journal, MALACOLOGIA, an international multi-lingual publication devoted to all aspects of the study of mollusks and designed especially to print longer papers and monographs. Papers will be published in English, German, French, Spanish and Russian with provision for multilingual abstracts. Sponsored (in addition to Dr. Burch) by Elmer G. Berry, Melbourne R. Carriker, Anne Gisman, Robert Robertson, Allyn G. Smith, Norman F. Sohl and Dwight W. Taylor and with an editorial board consisting (at present) of twenty world malacologists, the first issue of MALACOLOGIA will appear in September.

The following papers occupied the afternoon:

NOTES ON THE CLASSIFICATION OF FRESHWATER LIMPETS.¹

John Bayard Burch, Museum of Zoology, University of Michigan.

(Abstract)

Walker's (1923) classification of the Ancyliidae included eight subfamilies and fifteen genera. Since that time very little basic work has been done

¹ This investigation was supported (in part) by a grant, 2E-41, from the National Institute of Allergy and Infectious Diseases, U. S. Public Health Service.

on freshwater limpets, but succeeding classifications have considerably reshuffled the groups. For example, Thiele (1931) recognized only two subfamilies and four genera. Zilch (1959) restricts the Ancyliidae to only one genus, and recognizes four of Walker's subfamilies as distinct families.

In the present study representatives of the various freshwater ancyliid genera were studied in regard to their dorsal muscle scars. In this respect they fall into three groups: (1) In *Ancylus*, *Ancylastrum* and *Rhodacmea* the dorsal muscle scar is continuous and in the form of a reversed C, running from the left anterior side around the right side to the left posterior side. (2) In *Anisancylus*, *Burnupia*, *Laevapex* and *Uncancylus* there are usually three main muscle scars, one each on the anterior right and left sides and one on the left posterior side. Between the two anterior muscle scars and the right anterior and the posterior muscle scars there are smaller, usually broken areas of adhesive epithelium. (3) In *Ferrissia* and *Hebetancylus* the three dorsal muscle scars are arranged as in the second group but the broken areas of adhesive epithelium are lacking.

On the basis of muscle scars the above generic groups would appear to correspond to subfamilial groupings, in which case they could be designated as the Ancyliinae, Laevapecinae and the Ferrissiinae respectively. Insofar as known radular and other morphological characters and chromosome numbers support such a classification.

The muscle scar in *Amphigyra* is U-shaped and in *Neoplanorbis* it is J-shaped. The relationship of these genera to other freshwater limpets is obscure. Specimens of *Brondelia* and *Gundlachia* were not available for this study.

THE GENUS *LATIAxis* IN JAPAN. Anthony D'Attilio, Valley Stream, Long Island, New York.

(Abstract)

The rich development of *Latiaxis* on the southeast coast of Japan is noteworthy. The many forms occur at two localities so far explored, Kii Channel and Tosa Bay, in association with a largely endemic fauna. This area is fished commercially for crustacea but in the process of trawling much other marine life, including mollusks, is taken. The trawling is done at various depths to deeper than 100 fathoms. The bottom at these depths is mostly sand or sandy mud. Species of *Latiaxis* are found at all depths, although certain species are associated only with certain depths. *Latiaxis* are all believed to be without a radula and live upon corals and other coelenterates. They are probably parasitic in their existence but very little is known of their life history. The animal and operculum are very similar to *Murex*. Their taxonomy is poorly known although the literature has a number of generic and subgeneric names. Besides *Latiaxis*, *Coralliophila*, *Coralliobia*, and *Tolema* and others in the Magilidae, a number of names have been proposed for both Recent and fossil forms from the Mediterranean.

(Discussion)

Question: "How many species (of *Latiaxis*) are there?" D'Attilio: "About thirty, of which perhaps two-thirds have been described." Emerson: "Do you feel the same species are found in Japan and in the Caribbean?" D'At-

tilio: "Yes." Emerson: "Even for species found in 100 fathoms?" D'Attilio: "Yes."

By popular demand the series of beautiful slides was run again. Mr. D'Attilio explained that the photography was the work of Mr. George Ræihle of Elmhurst, New York, who had also collaborated with him in producing the drawings of shells used to decorate the covers of the current program (*Vasum horridum* Heilprin) and the annual report bulletin (*Io fulvialis* Say). As the final slide dropped into place, projectionist Dan Steger remarked that discontinuous distribution notwithstanding, nothing like that had been found in Tampa Bay!

SHELL-BORING HABIT OF *CAPULUS DANIELI* (CROSSE). Virginia Orr, Academy of Natural Sciences, Philadelphia.

(Abstract)

Capulus danieli (Crosse) is an antagonistic symbiont of *Comptopallium vexillum* (Reeve) (Pectinidae). Of six living specimens dredges in shallow bays near Noumea, New Caledonia, five had drilled a hole through the anterodorsal region of a valve of their host pectens. All of the drilling capulids were adult females with large brood sacs of developing eggs or veligers under the anterior third of their shells. The one non-boring specimen was in a transitional state between male and female phases and had no egg sac. As all holes were drilled over or near the pectens' mouth and the gut contents of the capulids and pectens were similar, it is presumed the drilling habit develops to pirate food when the efficiency of the food-gathering tracts of these ciliary feeding capulids are impaired by a bulky brood sac.

(Discussion)

Question: "How does he select that particular spot—does he travel about on the *Pecten* shell until he happens on the anterior siphon by chance?" Orr: "A good question, and I'd love to know!" Question: "Does the drilling kill the *Pecten*?" Orr: "No, *Capulus* seems to be short lived and dies after brooding while the host mollusk heals itself."

"BRAINWASH" EXPERIMENTS WITH MOLLUSKS. Henry E. Coomans, American Museum of Natural History, New York City.

(Abstract)

Brainwashing in humans is trying to change someone's ideas or principles, by using various methods. In "brainwash" experiments with Mollusks we tried to change their way of life; for instance making a fresh-water species from a marine animal, and forcing an intertidal species to live completely dry or always submerged.

In 1932 the Zuider Sea was closed off from the North Sea by a large dike, and it became the Yssel Lake, after which its water slowly became fresh. The 24 species of marine and brackish water Mollusks, that lived in the Zuider Sea before 1932, did not adapt to fresh water, and within two years they were extinct.

The experiments had been carried out in 1957 in the Caribbean Marine Biological Institute at Curaçao. Large quantities of 20 common Caribbean species of Gastropods and Chitons from the supralittoral, littoral and sublittoral zones were used in two types of experiments: submergence and exsiccation. In some cases the animals died; to know what was the average number of survival days, we used the number after which 50% of the animals were dead.

The results showed:

- a) supralittoral species (*Tectarius muricatus*, *Nodilittorina tuberculata*, *Littorina angulifera*, a.o.) were not able to live submerged. These animals died in less than one week. They were better adapted to live on land, since the exsiccation experiments showed that the supralittoral species were still alive after more than 3 months;
- b) the littoral animals (several species of *Nerita* and *Chiton*, a.o.), which have in nature a partly wet and partly dry life, could stand the submergence; in exsiccation the animals died in between one and two weeks.
- c) the sublittoral species (*Tegula excavata*, *Puperita pupa*, *Neritina virginea*, *Leucozonia nassa*, etc.) survived the submergence; in exsiccation they died after 1 or 2 days.

The experiments, of course, were not carried out with the intention to change the way of life of the animals, and we did not expect any positive results of the "brainwashing." The results showed, like the Mollusks in the Yssel Lake, that every large change in habitat, slowly or abrupt, ends in extinction of the species.

Another aspect that showed up was the fact there is a correlation between the stratification that the littoral species have in nature, and the average length of life in exsiccation or in submergence. The higher level, the longer time they live in exsiccation, the shorter time in submergence.

(Discussion)

Voss: "We tried essentially the same experiment with other West Indian species. *Siphonaria* is another that can't be brainwashed; it lives in the splash zone and will die if restricted to the area above or below it. Young *Livona pica* we found to be superlittoral but becomes sublittoral with age." Coomans: "*Siphonaria* having no operculum dries out quicker. We did not test *Livona pica* at differing age levels." Emerson: "All going to prove that it is difficult to reverse evolution in adults."

NEST BUILDING IN *MUSCULUS*. Arthur S. Merrill, U.S. Bureau of Commercial Fisheries, Woods Hole, Massachusetts.

(Abstract)

Musculus discors is one of the fouling organisms found living on the upper valve of the sea scallop, *Placopecten magellanicus*. It lives nestled within a byssal capsule or "nest," which it weaves about itself and attaches to the scallop shell.

The nest is made of threads of conchiolin produced by special secretory glands. As in other Mytilidae the threads are formed and attached by a remarkably agile and extensible foot. *Musculus* first secures its position

by attaching threads to the substrate in the immediate periphery. It then begins to rotate its foot completely around itself, attaching threads near the opposite shell edge to threads previously produced. Thereafter, threads are also interwoven diagonally about the shell, thousands of threads being produced before the nest is completely and securely matted together.

The animal works sporadically at weaving, the foot attaching several threads industriously, then retiring for an indefinite period. Much mucus is elaborated during the period of active nest building, small globules of this material aiding in collecting debris among the threads. After the nest is compact and well established, the animal occasionally passes its foot over and around stationary organisms which have since attached to the nest, incorporating them in the outer fringes of the nest, thus producing an effective camouflage. When the valves are closed, the shell cannot be seen, so completely does the nest surround it. However, when the valves are apart for feeding and respiring, an oval opening in the ventroposterior area is apparent through which the incurrent and excurrent siphons extend.

Not only is *Musculus* protected within the nest, but so is its offspring. This species deposits egg capsules in long strings along the inner lining of the nest where they remain, protected, through larval and early postlarval development.

(Discussion)

Question: "How large does *Musculus discors* grow?" Merrill: "Fully adult, from one to one and a half inches. These were about three-quarters of an inch." Jacobson: "What limits the size of the nest in nature? It would seem that without restriction the animal would suffocate?" Merrill: "They always seem to keep the feeding area clear."

This paper closed the afternoon session, and the Executive Council met before the dinner hour.

* * *

A return to the auditorium was scheduled following dinner; a fine series of fossil shells had been arranged at the front of the room by Mrs. Edna Marcott of the St. Petersburg Shell Club, and the series of slides which accompanied her brief paper made clear the fact that collecting fossil shells is every bit as enjoyable—and as rigorous—as collecting Recent species.

(Abstract)

The Pliocene fossils shown were of the Caloosahatchee Formation, collected on the spoil banks of Lake Okeechobee at the Harney Pond canal. Here the matrix evidently was a perfect preservative; bivalves are still in conjunction, gastropods with perfect lip and sometimes protoconch as well. One of five specimens of *Turbo rhettogrammicus* contains the operculum, while the fronds of the *Murex* are so perfect they rival Recent shells.

This same Caloosahatchee Formation has turned up in St. Petersburg, but here the shells are of a definite buff color. It has been suggested that this condition is caused by tannic acid from palmetto roots. Whatever the explanation, these shells are identical (save for color) with their white counterparts from Lake Okeechobee.

The remainder of the evening was given over to the showing of slides by members, always a popular feature. A series of beautiful and unusual shells

from the collection of Nick Katsaras opened the show, then scenes from the 1961 meeting which were the contribution of Edwin Cowles, Jr. Candid camera shots from the Montreal meeting were shown by Dr. E. Laurence Palmer, and of the St. Petersburg Shell Club in action by Dan Steger. Mrs. Dorma Coley's slides transported her audience to Seattle to view the World's Fair and some charming shell studies; scenes of past meetings and of members now departed were the contribution of Florence Kuczynski. Mrs. George Raeihle topped off the evening with more scenes from the Montreal meeting followed by a quick switch to the trials, tribulations and rewards of collecting fossil shells in the Lake Okeechobee region of Florida.

* * *

The group photograph was made before the opening session on Thursday, then the relentless gavel and the first paper:

WHAT IS *CYPRAEA ARABICA NIGER* ROBERTS? William E. Old,
American Museum of Natural History, New York City.

(Abstract)

The shell usually known as *Cypraea arabica niger*, is in reality, a melanistic form of *C. eglantina* Duclos. This form occurs in varying degrees of melanism. The shell may also be distorted or rostrate with callused extremities. While melanistic *C. arabica* do occur (*C. arabica* form *atra* Dautzenberg), they are much rarer than the melanistic *C. eglantina*.

G. B. Sowerby (1880) figured in *Thesaurus Conchyliorum*, *Cypraea*, figs. 282-283, two views of a shell he labeled *C. arabica* var. *eglantina* Duclos. Roberts (1885) described *C. arabica niger*, citing Sowerby's figure 282 as the same. The present location of Roberts' type is not known. It is not in the Academy of Natural Sciences of Philadelphia.

Workers, including Schilder (1932) placed *niger* in the synonymy of *eglantina*. However, the Schilders (1939) considered *niger* Roberts the earliest available name for the Melanesian-Polynesian race of *C. arabica* L. The Schilders (1952) stated that their decision was based on the "large lateral spots" of Sowerby's figure. Since the Schilders questioned the accuracy of other Sowerby drawings, this one may also be incorrect.

From slides of Sowerby's figures and of specimens in the American Museum, it was demonstrated that this shell with uncalled spire and margins, and more numerous teeth is almost certainly *C. eglantina*. Until Roberts' type is located and studied, the name *niger* is best relegated to the synonymy of *eglantina*.

The Schilders post-1938 concept of *C. arabica niger* should be considered as *C. arabica arabica* L. (Splitting the Pacific *C. arabica* into three overlapping races—*a. arabica*, *asiatica*, *niger*—serves little purpose.)

The earliest available name for the melanistic New Caledonia shell is *C. eglantina* form *nigricans* Crosse, 1869 (not "Montrouzier" Crosse, 1875, nor Dautzenberg, 1923). Synonyms are *niger* Roberts, and *luctuosa* Dautzenberg, 1903.

CUBA, A LOST SHELL PARADISE. Morris K. Jacobson, Rockaway Beach, New York.

(Abstract)

The present political situation in Cuba probably means that for some time to come outsiders will not be able to visit that island and collect the incomparable land shells. There is much work to be done before the land mollusks of the island are understood. So far most of the work has been limited to description of novelties. A thorough study of such forms as *Emoda*, *Viana* and other calciphiles is necessary in order to bring some sort of understanding to the bewildering variety of forms. There is a good possibility that true clines will be found here. In the meantime the danger exists that the present natural distribution of forms will be disturbed by increased building and farming activities.

ROCHEFORTIA—A NEW RECORD IN TAMPA BAY. J. P. E. Morrison,¹
U.S. National Museum, Washington, D.C.

(Abstract)

Some 2 mm clam shells dredged from the mud of Old Tampa Bay, near Bridgeport, Pinellas Co., Florida, belong to the genus *Rochefortia*. Comparative study of all shells of this complex available show that the genera *Montacuta*, *Aligena*, and *Hindsiella* have a dorsoventrally thin, posterior widening resilium. In contrast, *Mysella* and *Rochefortia* possess a resilium similar to that of the Mactridae, a dorsoventrally high wedge immediately and only below the beaks.

Mysella has only one anterior hinge tooth on the right valve. The genus *Mysella* includes *concentrica* Gould, *donaciformis* Angas, *ovalis* Tate, *lactea* Hedley, *spernax* Iredale, *vitrea* Laseron, and *cretacea* Laseron, from the Australian Region and the East Pacific species *beringensis* Dall, *planata* Dall, and *tumida* Carpenter. The Arctic species *M. planata* Dall is also recorded from Greenland in the Western Atlantic.

Rochefortia has only two hinge teeth, anterior and posterior laminae on the right valve. In the Indo-Pacific, *Rochefortia* includes *australis* Velain, *reniformis* Suter, *convexa* Gould, *enora* Bartsch, *similis* E. A. Smith, *natalensis* E. A. Smith, *elsa* Bartsch, *kraussi* Turton, *compacta* Gould, *crenatula* Gould, and *actiniophila* Yamamoto and Habe. East Pacific *Rochefortia* include *sovaliki* MacGinitie, *aleutica* Dall, *ferruginosa* Dall, *pedroana* Dall, *golischi* Dall, *compressa* Dall, *grippi* Dall, and *rochebrunei* Dall. East Atlantic species include *M. sovaliki* MacGinitie, *dawsoni* Jeffreys, *bidentata* Montagu, and *tumidula* Jeffreys. Present in Western Atlantic waters are *M. sovaliki* MacGinitie, *dawsoni* Jeffreys, *ovata* Jeffreys, *planulata* Stimpson, *striatula* Verrill and Bush, *triquetra* Verrill and Bush, *cuneata* Dall, and *barbadensis* Dall.

There may be two species of these tiny clams, of the group of *Rochefortia planulata* Stimpson, in the Tampa Bay region, commensal with different host species of Crustacea and/or Annelids.

(Discussion)

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Voss: "What's the host—is it always a crab or a worm?" Morrison: "I don't know!" Root: "In Lake Worth we get *Aligena elevata* Stimpson, but have not actually found it with the bamboo worm (*Glymenella torquata*) which is its reported host." Dunn: "How deep should we dredge in Tampa Bay for *Rochefortia*?" Morrison: "I'd say from five to ten feet, and use a fine screen." Steger: "That would be Old Tampa Bay?" Morrison: "Yes." Raeihle: "Did you collect *Rochefortia* alive?" Morrison: "No, I found only dead specimens." Jacobson: "We found a small red clam in Rockaway Beach, New York with a well-developed pallial sinus; could it have been *Rochefortia*?" Morrison: "No, that sounds like *Lasaea rubra* Montagu, which is a littoral species. It lives along the shore, even intertidally, attached by a strong byssus to the underside of rocks or in empty barnacle shells."

FRESHWATER MOLLUSKS OF GEORGIA. William J. Clench, Museum of Comparative Zoology, Harvard University.

(Abstract)

The five physiographic areas in the state were outlined along with the large river systems. Faunistic relationships and differences in the mollusks were given for these river systems.

TRIPHORIDAE OF THE FLORIDA WEST COAST. Dan Steger, Tampa, Florida.

(Abstract)

The family Triphoridae is represented on the west coast of Florida by not less than 14, probably not more than 17 species. Only two are found in the littoral zone and only two seem to live beyond a depth of 50 fathoms. The rest are all found in the coral and sponge area from 15 to 50 fms. *T. nigrocincta* C. B. Adams is fairly common on shallow grass flats in areas of relatively high salinity. *T. intermedia* C. B. Adams is recorded from Marco Island. The two deep-water Triphoridae differ from all other species in that their protoconch of not more than 3 rather bulbous whorls has no axial ribs and develops a peripheral keel on the final whorl. The tapering protoconch of all the other species has 4 or more whorls with at least 3 of them axially ribbed. The larger of the deep-water species, length to 40 mm, has been identified as *T. longissima* Dall. This may be the most abundant *Triphora* since over 100 specimens have been found in the rather limited material available from these depths. The other deep-water species, size up to 9 mm, of which 17 specimens have been collected, remains unidentified.

The most common *Triphora* from the coral and sponge zone might be called a trilogy: *T. melaunra* C. B. Adams, *T. modesta* C. B. Adams, and *T. pulchella* C. B. Adams, all about 4 mm and similar but separable in shape and sculpture. *T. decorata* C. B. Adams and what has been determined as *T. ornata* Deshayes, are found in small colonies, largest to date 19 specimens, length to about 10 mm. All the others are uncommon, unicolored and undetermined except *T. turrithomae* Orbigny which is rather rare in the Gulf from 20 to 40 fms, but is reported as common in shallow water farther south.

As he concluded his presentation of the exquisite tiny mollusks, Mr. Steger made a plea for molluscan literature. "We have as yet no research library of any value in our area, and the St. Petersburg Shell Club is interested in assembling reference material. So is Dr. Reed of the Department of Biology of this University, so is Dr. G. Robertson of the University of Southern Florida. We will welcome reprints, separates, anything at all, and can offer specimens or sets of mollusks of this area to institutions or any interested individual."

* * *

A break for lunch, and the afternoon session opened with the annual business meeting.

Minutes of the previous business meeting were not read since proceedings had appeared in the 1961 annual report bulletin.

The Secretary-Treasurer read the following report concerning operation of the organization during the fiscal year 1961-1962:

SECRETARY-TREASURER'S REPORT

On June 1, 1962, membership in the American Malacological Union totaled 820. One hundred and twenty-one had enrolled as members over the previous twelve months, 64 were lost. Death claimed 7, 2 resigned and 55 were dropped for delinquent dues.

Membership is classified as follows: there are 575 regular members, 163 hold joint memberships, 18 are paid life members, 20 live outside the western hemisphere hence are corresponding members, 29 local shell clubs and 9 universities (or institutions) pay dues as regular members. There are 5 honorary life members, one honorary life president. Those 146 members living west of the Rocky Mountains and in Hawaii are considered members of the Pacific Division and on behalf of that body are billed for a per capita assessment of fifty cents (annually) in addition to their regular dues.

Ballots were mailed to all members that they might vote on the proposed constitutional change which separates the offices of secretary and treasurer. Of the ballots returned, 168 were in favor, two opposed.

Seven hundred and fifty copies of the annual report bulletin were printed for a per-copy cost (plus mailing fee) of \$1.32. New style membership cards were drafted and a three-year supply printed.

Over the past year 226 copies of **HOW TO COLLECT SHELLS** were sold, nearly all by mail as single copies. The deficit (two editions) has been reduced to \$59.60 and 538 copies remain to be sold. As directed by the Executive Council in 1961 the type was purchased at a cost of \$187.20 for future reprinting.

On the financial side, the 1961-62 fiscal year was begun with a credit balance of \$962.13. Receipts for the 12-month period totaled \$1,546.05, expenditures \$1,780.46, a 12-month deficit of \$234.41 but a current credit balance of \$727.72. (A complete financial report appears on page 21.)

The financial situation is better than over the previous twelve months, although again expenditures exceeded receipts. Extra revenue from the increase in dues will put the balance back into the black when accumulated 1962-63 dues are credited. The relatively small amount (\$572) credited to dues in the current report is to be explained by an erroneous practice of

earlier years, that of posting dues as they came in, hence an early billing resulted in monies being credited to a period already paid up and a subsequent shortage in the next.

It was moved from the floor, seconded and carried that this report be accepted as read.

The secretary was asked to report briefly on action taken by the Executive Council at the August second meeting of that body.

EXECUTIVE COUNCIL MEETING

The report of the committee formed to investigate the advisability of incorporating the AMU as a scientific, non-profit organization was heard, discussed and the unanimous conclusion reached that at the present time the advantages are insufficient to warrant the action.

An invitation to hold the 1963 meeting at the Museum of Science, Buffalo, New York was accepted.

Two motions and a resolution made by the Pacific Division and sent for consideration to the parent organization were read and the following action taken: Motion Number One providing for a reduction in registration fee to any Pacific Division member attending the annual convention, and that the names of registered guests and visitors be placed on the mailing list was declared ambiguous and tabled pending clarification. Motion Number Two recommending that the AMU secretary be compensated on a per capita basis was disapproved. Resolution Number One nominating an official AMU representative, together with an alternate, to the coming First European Malacological Congress was not considered since no request that a representative be sent had come from the European body.

However, it was decided that the incumbent AMU president, Dr. Albert R. Mead be directed to bear the greetings of the AMU to the European group, and in the event that he is unable to attend, that he appoint his own alternate.

As the result of the affirmative vote of the membership, the office of secretary-treasurer was declared abolished and two new offices—that of Secretary and of Treasurer—were created.

The report of the Nominating Committee was heard and the Executive Council voted to go on record as giving unanimous approval to the slate as read.

This concluded the report of the Executive Council meeting.

President Emerson called upon the Chairman of the Nominating Committee for a report; Dr. J. P. E. Morrison read the following slate of officers selected by his committee:

President, Albert R. Mead

Vice-President, John Q. Burch

2nd Vice-President, Crawford N. Cate

Secretary, Margaret C. Teskey

Treasurer, Jean M. Cate

Publications Editor, Morris K. Jacobson

Councillors-at-Large: Mrs. Horace B. Baker, Dolores Dundee,

Arthur H. Clarke, Jr., Donald R. Moore

Upon the call for further nominations from the floor, the motion was

made, seconded and carried that the secretary be instructed to cast a single ballot for the slate as read.

There being no further business, it was moved, seconded and carried that the 1962 business meeting be closed.

* * *

President Emerson read several letters and wires which had arrived since the start of the meeting; they bore greetings and good wishes from Chairman Crawford N. Cate on behalf of the Pacific Division, from Past-Chairman Robert W. Talmadge, AMU President-Elect Albert R. Mead, Mr. and Mrs. Alger P. Blaine, Vincente Condè, Theodore Leslie and Mr. and Mrs. Arthur H. Clarke, Jr.

In connection with the Clarkes' greeting, Dr. Emerson announced that word had been received of the recent death of Dr. Clarke's young protege Chris Bailie who had attended the past two AMU meetings. A bolt of lightning had put an end to a promising career.

Mrs. Francis Lewis rose to report that she together with Miss Estelle Windhorst had attended the meeting of the Pacific Division, recently concluded. They had found it delightful and instructive, and urged that as many of the AMU members as possible plan to attend the 1963 meeting.

Following a brief intermission and for the last time in 1962, the gavel sounded to herald the final session.

REPORT ON THE SAN DIEGO MUSEUM EXPEDITION TO THE VERMILLION SEA, BAJA CALIFORNIA. William K. Emerson, American Museum of Natural History, New York City.

This feature was an hour-long color film of unusual interest which documented a collecting trip to several of the little-known islands which rise in the Gulf of California. The narration was by Dr. Emerson who had been a member of the team; his chronicle of the successful expedition left his audience with a sense of disappointment at not having been along.

* * *

Two hours elapsed between the closing of the session and boarding of the bus which transported the crowd, now finery bedecked, to the Outrigger Inn on the outskirts of St. Petersburg. The Polynesian decor of the beautiful restaurant set the party mood and quite soon everyone, bedecked with lei, had accepted relaxing refreshment in the lounge which had been set aside, together with private dining room, for the use of the visiting malacologists. The delicious and unusual meal which followed was luau style though in deference to Western palates neither poi nor raw fish was served.

With the coffee, Dr. Emerson rose to call the roll of the many shell clubs with members in the audience. Members were invited to stand, and most of the thirty-two local clubs scattered from Boston to the Ryukyu Islands had at least one representative present. Best represented of course was the St. Petersburg Shell Club, and Dr. Emerson requested that these hard-working people remain standing to receive an ovation from their appreciative guests.

The tables were cleared, a screen set up and two interesting and educational films were enjoyed. The first, MOLLUSKS—A STORY OF ADAPTATION,

was, as the title suggests, a study in evolution. CHALLENGE OF THE OCEANS illustrated the ingenious means by which man seeks to sound, see and perhaps one day to visit those depths which have hitherto been regarded as forever a mystery.

(Showing of these new films, product of McGraw-Hill, was arranged for by Mr. Henry Gordon of the New York Shell Club.)

It is always difficult to terminate these festive occasions and this was no exception. The return to the college was mandatory, but once there the crowd broke into congenial groups to continue the pleasant association so soon to be ended for another year. A few sought the beach for a brief swim in waters made magic by phosphorescence, others sojourned to air-conditioned lounges in the dormitory while still other groups sought certain non-air-conditioned establishments off campus.

But not for long. As a local columnist observed in his newspaper report of the meeting, malacologists are not given to hoopla; by midnight not a light burned, all was quiet.

* * *

Quite a different appearing crowd assembled the following morning, dressed for the beach. The familiar bus was again boarded and provided transportation to a picnic area on the famed Sunshine Skyway. Most of the St. Petersburg crowd made the trip in private autos, bringing along their pet collecting gear for the use of the visitors.

The beach on either side of the causeway was thoroughly combed, much of the bottom beyond tide line was raked by hand dredges, and to provide collecting with a minimum of effort Mr. Dan Steger had much earlier made several hauls well offshore and piled the dredgings on tables in the shade!

A box lunch at noon interrupted the collectors but briefly; it was well past midafternoon before the final straggler was ready to call it a day and boarded the bus for the return to a hot shower and perhaps a frantic rush to pack and depart.

A handful of the faithful spent Friday night in the dormitory but by noon on Saturday had departed to return home or to resume interrupted vacations.

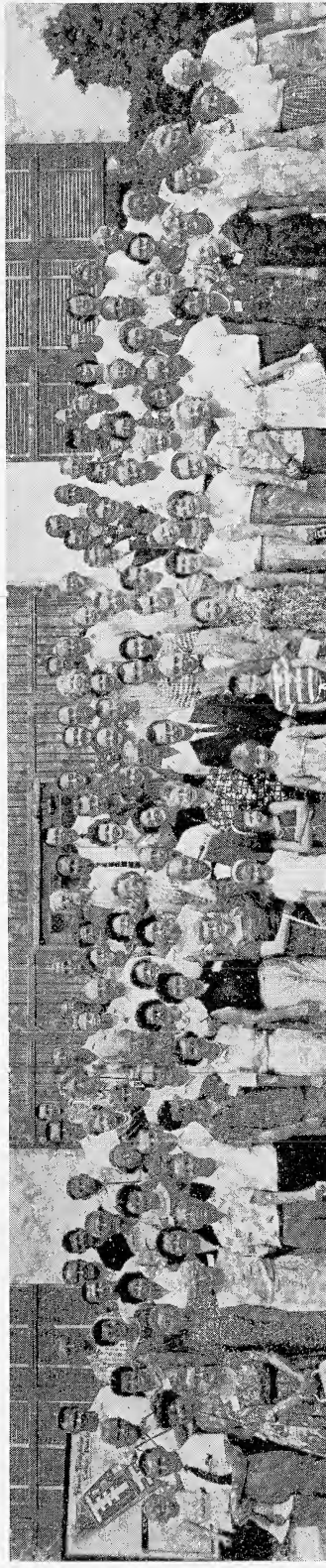
Margaret C. Teskey, Secretary
AMERICAN MALACOLOGICAL UNION

REGISTRATION, 1962 AMU MEETING

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Edna L. Anderson, Jacksonville, Florida
Dr. and Mrs. H. B. Baker, Gail and Beth, Havertown, Pennsylvania
Margaret E. Bearce, Palm Beach, Florida
Mr. and Mrs. Alvin P. Bippus, Toledo, Ohio
Walter Blinn, E. Lansing, Michigan
Hugh Bowin, Treasure Island, Florida
Dr. and Mrs. J. Chester Bradley, Ithaca, New York
Mrs. Ward Brown, Lake Worth, Florida
Dr. John Bayard Burch, Ann Arbor, Michigan

Earl Chester, Ft. Lauderdale, Florida
 Dr. William J. Clench, Boston, Massachusetts
 Mrs. Dorma Coley, Winston-Salem, North Carolina
 Juliette Compitello, Brooklyn, New York
 Dr. and Mrs. Henry E. Coomans and Cynthia, New York City
 Edward Cowles, New Rochelle, New York
 Ruth E. Craine, Norwich, New York
 Mr. and Mrs. Robert Cull, Brecksville, Ohio
 Mary D'Ainto, St. Petersburg, Florida
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 Harley L. Freeman, Ormond Beach, Florida
 Sam Fuller, Chestnut Hill, Massachusetts
 Anne Gismann, Ann Arbor, Michigan
 Marilyn Gordon, St. Petersburg, Florida
 Inez Gruetzmacher, Menominee, Michigan
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 Dorothy E. Hannsler, St. Petersburg, Florida
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 Mrs. Aileen and Harry Kingston, Beaumont, Texas
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 Virginia Lee, West Palm Beach, Florida
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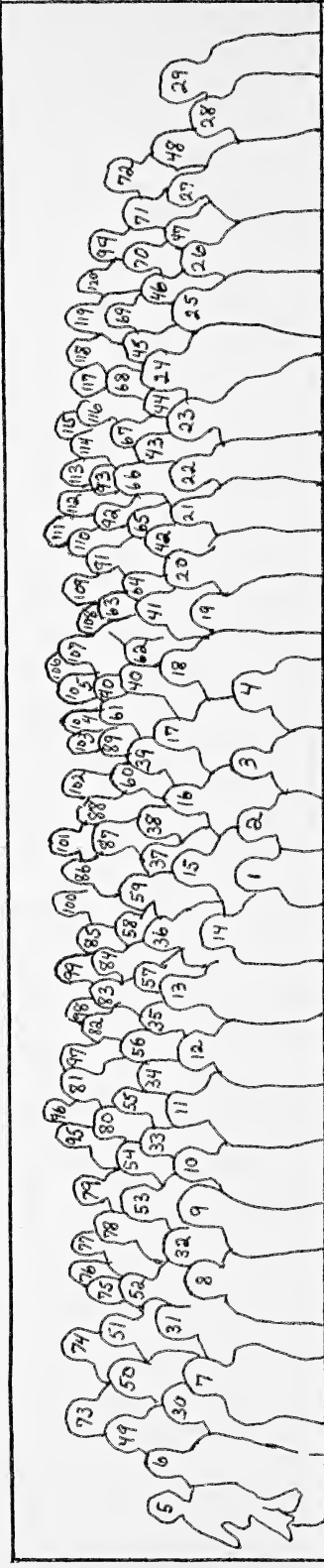
Dr. Arthur S. Merrill, Woods Hole, Massachusetts
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AMERICAN MALACOLOGICAL UNION TWENTY-NINTH ANNUAL MEETING

St. Petersburg, Florida

July 31 - August 3, 1962



1. Juliette Warmke, 2. Sally Johnson, 3. Marji Johnson, 4. Paul Jeffreys, 5. Cynthia Coomans, 6. Dr. H. Coomans, 7. Dorma Coley, 8. Mrs. John Proetz, 9. John Proetz, 10. Harry Kingston, 11. Sam Fuller, 12. Germaine Warmke, 13. Mrs. Richard Johnson, 14. Mrs. Norman Weisbord, 15. M. K. Jacobson, 16. Margaret Teskey, 17. Dr. William Emerson, 18. William Clench, 19. Dorothy Hanssler, 20. Madeline Decker, 21. Mrs. Adlai Wheel, Sr., 22. Adlai Wheel, Sr., 23. Mrs. Carl Withrow, 24. Carl Withrow, 25. Elizabeth Hood, 26. Hellen Notter, 27. Elma Handville, 28. Mrs. J. Parodiz, 29. Katherine V. W. Palmer, 30. Mrs. H. Coomans, 31. Ruth Craine, 32. Florence Kuczynski, 33. Anthony D'Attilio, 34. A. Lothrop Luttrell, 35. Mrs. Luttrell, 36. Dorothy Raehle, 37. Francis Smith, 38. Mrs. Dan Steger, 39. Roger Dunn, 40. William Heard, 41. Fred Thompson, 42. Edna Marcott, 43. Louise Travers, 44. Mrs. Smith White, 45. Juliette Compittello, 46. Neva Harper, 47. Mrs. A. Leslie Potter, 48. Gertrude Weber, 49. E. Laurence Palmer, 50. Dee Dundee, 51. Virginia Orr, 52. Inez Gruetzmacher, 53. Mrs. A. D'Attilio, 54. Mrs. William Reader, 55. Mrs. Bernice McCaul, 56. Maude Nickerson, 57. Mrs. Peter Plummer, 58. Mrs. Harry Kingston, 59. Annabel Wetzell, 60. Mrs. Alvin Bippus, 61. Norman Reigel, 62. Mercedes Scasso, 63. Harley Freeman, 64. Unidentified, 65. Unidentified, 66. Unidentified, 67. Unidentified, 68. Mrs. Ward Brown, 69. Nick Katsaras, 70. Jean Jeffreys, 71. Mrs. Clinton W. Sheaffer, 72. Clinton W. Sheaffer, 73. John B. Burch, 74. Arthur Merrill, 75. Harold Walters, 76. Dan Steger, 77. Earl Chesler, 78. William Reader, 79. Eugene Schmeck, 80. Estelle Windhorst, 81. Selma Lawson, 82. Mrs. Charles Lewis, 83. Arnon Mehring, 84. Mrs. Francis Smith, 85. Mrs. E. Flynn Ford, 86. Emile Malek, 87. Marion Schroth, 88. Alvin Bippus, 89. J. J. Parodiz, 90. Lulu Sickman, 91. Mrs. A. Chester Bradley, 92. Margaret Bearce, 93. Mrs. Harold Feinburg, 94. Unidentified, 95. Walter Glen, 96. Edwin Cowles, Jr., 97. Arthur Lawson, 98. Tom McGinty, 99. E. Flynn Ford, 100. G. Usticke, 101. William E. Old, Jr., 102. Harold Feinberg, 103. James Donovan, 104. J. P. E. Morrison, 105. Mrs. James Donovan, 106. Paul McGinty, 107. Henry Wehringer, 108. Mrs. H. Wehringer, 109. A. Chester Bradley, 110. R. Tucker Abbott, 111. Richard I. Johnson, 112. Hugh Bowen, 113. H. B. Baker, 114. Paul Deatrick, 115. Donald R. Moore, 116. John Root, 117. Beth Baker, 118. Norman Weisbord, 119. LaVerne Weddle, 120. Mrs H. B. Baker.

AMERICAN MALACOLOGICAL UNION

1961-62 Financial Report

June 1, 1962

RECEIPTS	\$1,546.05
Membership dues, regular	572.00
Life membership purchased (5)	200.00
Anonymous donation	250.00
Refund 1961 meeting advances (AMU and Pac-Div)	50.00
Sale of back issues, Annual Report	20.00
"How to Collect Shells,"	447.13
Interest, life membership savings account	6.92
EXPENDITURES	\$1,780.46
Postage and express	105.30
Printing, mailing Annual Report	1,000.94
Stationery	106.83
Mimeographing	37.24
Addressograph stencils	14.96
Bank charges, check collections	2.84
"How to Collect Shells," adv. and stamps	56.33
"How to Collect Shells," type purchased	187.20
1961 AMU meeting expenses	17.65
Secretary's expenses, 1961 AMU meeting	201.02
Pacific Division Secretary's expenses, P. D. meeting	44.00
Miscellaneous	6.15
CURRENT CREDIT BALANCE	\$ 727.72
Expenditures, 1961-62	1,780.46
Receipts, 1961-62	1,546.05
Deficit, 1961-62	234.41
Credit balance, June 1, 1961	962.13

I certify that this accounting is complete and correct to the best of my knowledge.

Margaret C. Teskey, Secretary-Treasurer

AMERICAN MALACOLOGICAL UNION

THE AMERICAN MALACOLOGICAL UNION

EXECUTIVE COUNCIL

1962 - 1963

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Officers

President ALBERT R. MEAD
 Vice-President JOHN Q. BURCH
 Second Vice-President (Chairman, A.M.U.P.D.) CRAWFORD N. CATE
 Secretary MARGARET C. TESKEY
 Publications Editor MORRIS K. JACOBSON
 Treasurer JEAN M. CATE

+

Councillors-at-Large

Mrs. H. B. Baker	Dolores S. Dundee
Arthur H. Clarke, Jr.	Donald R. Moore

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Past Presidents — Permanent Council Members

William J. Clench (1935)	A. Byron Leonard (1953)
Joshua L. Baily, Jr. (1937)	Joseph C. Bequaert (1954)
Horace B. Baker (1940)	Morris K. Jacobson (1955)
Harald A. Rehder (1941)	Allyn G. Smith (1956)
Henry van der Schalie (1946-47)	Ruth D. Turner (1957)
Myra Keen (1948)	Aurèle LaRocque (1958)
Elmer G. Berry (1949)	R. Tucker Abbott (1959)
Fritz Haas (1950)	Katherine V. W. Palmer (1960)
J. P. E. Morrison (1951)	Thomas E. Pulley (1961)
William K. Emerson (1962)	

+

PACIFIC DIVISION EXECUTIVE BOARD

1962 - 1963

Chairman CRAWFORD N. CATE
 Vice-Chairman A. MYRA KEEN
 Secretary RUTH FRENCH
 Treasurer FAY WOLFSON
 Past Chairmen JOHN E. FITCH, ALBERT R. MEAD, ROBERT W. TALMADGE

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HONORARY LIFE MEMBERS

H. B. Baker	Katherine V. W. Palmer
William J. Clench	Fritz Haas
Joseph C. Bequaert	

HONORARY LIFE PRESIDENT

S. Stillman Berry

**AMERICAN MALACOLOGICAL UNION—PACIFIC DIVISION
FIFTEENTH ANNUAL MEETING
Asilomar, California
June 27–30, 1962**

The Fifteenth Annual Meeting of the American Malacological Union—Pacific Division, held at Asilomar, Pacific Grove, California, June 27–30, 1962, was opened and greetings extended by Robert R. Talmadge, Chairman, to a group of 84 members and guests assembled.

Greetings and wishes for a successful meeting were also acknowledged from Dr. William K. Emerson and Margaret Teskey, President and Secretary of the AMU.

Several announcements regarding the program, exhibits, group photograph, field trips, executive meeting, reception, banquet and special events completed the business for the opening session.

A short executive meeting followed the adjournment of the opening session.

Wednesday evening a reception sponsored by the Sacramento Valley Conchological Society and the Northern California Malacological Club was held in the living room of Surf and Sand. A command view of the ocean, sunset, sand dunes and beautifully twisted cypress, oaks and Monterey pines was a memorable sight. Attractive arrangements of shells and flowers graced the tables. These works of art by Elsie Hutson and her committee created considerable comment. A magnificently carved helmet shell, mounted on a metal base, given to Mary Larson by one of her students, was the center of attraction with speculation on its age, history and beautiful delicate carving.

During the course of the evening, prizes were given for various reasons and coffee, punch and cake were served by the committee in charge.

Those receiving prizes were Ann Marti, for distance traveled (Balboa, Canal Zone); Helen Hunt and Barbara J. Good, having birthdays during the annual meeting; Jens M. Ostergaard, for being the oldest person present and the oldest collector; Christine Hoskins, youngest present having a collection; Roy L. Morrison, for being the first to register; Mr. and Mrs. Harold Baker, for sending in the first reservation; and Gale Sphon, who won the door prize. Since there were several prizes donated, numbers were drawn until all were distributed.

All enjoyed an evening of good fellowship, inspiring "shell" conversations and becoming acquainted with new and reacquainted with old friends. This feeling seemed to prevail throughout the whole meeting.

John Q. Burch opened the Thursday morning session with his paper—

THE GENUS *OLIVELLA* IN THE EASTERN PACIFIC. (illustrated)

(Abstract)

A key to all recognized species was read with comments on them. They were illustrated with Kodachrome slides. Twenty-five species were accepted, and a number of questionable forms discussed.

Allyn G. Smith followed, presenting an illustrated talk on—

THE CHITON FAUNA OF GUADALUPE ISLAND, with comments on the unusual development of *Ischnochiton asthenes* Berry 1919.

(Abstract)

The known chiton fauna of Guadalupe Island has been listed by Chace (Trans. San Diego Soc. Nat. Hist., vol. 12, no. 19, October 16, 1958) as consisting of 12 species. To these, six additional species are added based on a collection made by M. Woodbridge Williams during the Kenyon-Williams Expedition to Baja California in 1946, as follows: *Stenoplax heathiana* Berry; *Stenoplax* species? (young example); *Cyanoplax hartwegi* (Carpenter); *Dendrochiton gothicus* (Carpenter); *Callistochiton palmulatus mirabilis* Pilsbry; and *Ischnochiton asthenes* Berry. All are generally representative of a southern California fauna.

Ischnochiton asthenes has heretofore been found only in southern California and a considerable extension of its range southward is indicated. Also, close examination of specimens from the original lot of *I. asthenes* from White's Point, Los Angeles County, California, and from Guadalupe Island shows clearly that the eggs of this species do not pass through the usual free-swimming veliger stage but develop into minute, fully formed chitons along the underside of the mother's mantle. This is of more than passing interest as it is only the third chiton species reported as mothering its young during the early stage of development. The other two species are *Callistochiton viviparus* Plate from Chile, reported by Plate in 1899; and *Schizoplax brandti* (Middendorff) from the south Kurile Islands, reported by Kussakin in 1960.

Fay Wolfson presented the next illustrated paper—

A STATISTICAL STUDY OF THE *CONUS PERPLEXUS* SOWERBY, AND *CONUS XIMENES* GRAY. No abstract was submitted.

Crawford N. Cate followed with—

COMPARISON OF TWO RARE COWRIE SPECIES. (illustrated)

(Abstract)

The identities of *Cypraea (Zoila) venusta* Sowerby, 1846 and *C. (Z.) episema* Iredale, 1939 have long been confused because of the difficulty in obtaining the original literature pertaining to both species. The literary references to both species are traced and the important points in each reference pointed out. An attempt is made to separate the two species on the basis of shell morphology.

The following papers were given during the afternoon session:

SYSTEMATICS OF INDO-PACIFIC CONIDAE. (illustrated) Dr. Alan J. Kohn. No abstract submitted.

A TAXONOMIC PROBLEM IN THE OCENEBRAS. (illustrated) Emery P. Chace.

(Abstract)

Notes on some of the *Murex* shells that are now listed as *Ocenebras*, especially the earliest described ones with some notes on variation and comments on some of the more recently described species. Illustrated by several slides including figures of Hinds 1844 and slides of plates of more recently published figures of this group.

A FEW NOTES ON THE INTERTIDAL ZONATION OF THE WEST MEXICAN COAST. (illustrated) Eugene Coan.

(Abstract)

At the suggestion of Dr. Keen, the author observed the intertidal zonation in the spots he visited on his trip to the West Mexican coast during December 1961.

The complexity of the ecological factors involved produces zonation which varies greatly in different areas. A system for naming intertidal zones universally present was designed by the Stephensons in 1949. This system seemed applicable on the arid West Mexican coast, as it had to Dr. Keen during her visits to the area.

The author mentioned the variations in sub-zones seen in different areas, and illustrated the talk with slides taken at Mazatlán. The possible importance of observing zonation in collecting and labeling mollusks was noted.

PLANS FOR AN ILLUSTRATED HANDBOOK OF WEST AMERICAN PROSOBRANCH GASTROPODS. (illustrated) James McLean.

(Abstract)

This is a progress report on work under way at Stanford University—a monographic treatment of prosobranch gastropods in the area between Cedros Island, Lower California, and Point Barrow, Alaska, as a doctoral dissertation. Although there have been several compilations on the complete molluscan fauna in this region, three major aspects have not received adequate treatment. The first is a collated bibliography; second, the recording of full synonymy; and third, illustration of type specimens, both of recognized species and of synonymous forms. In addition to coverage of these points, I plan to cite type localities, locations of type specimens, revised ranges, and biological information about each species. A trinomial designation will be used only for geographically differentiated subspecies. All other named varieties will be placed in synonymy. The help of collectors is solicited, both for range extensions and for the loan of unidentified or unusual specimens.

Thursday evening Helen Burton gave an illustrated talk on "Lecturing to School Children." Helen began her lecturing in January and ended her tour in April, having covered a distance of 6,500 miles, presenting 213 lectures. She emphasized her lectures with kodachrome slides and displays of marine life. She estimates that approximately 75% of her lectures were given in small outlying districts, where often the assembled groups were

children from kindergarten through high school age who had never been to the ocean.

Ned Baker then discussed his method of teaching the Indian children and showed kodachrome slides of marine animals taken in their native habitat.

Friday morning's session included the following:

RANDOM NOTES ON *LITTORINA NEWCOMBIANA* HEMPHILL.
(illustrated) Robert R. Talmadge.

(Abstract)

Henry Hemphill originally placed this species in the freshwater genus *Paludinella*. Gross experiments, when combined with field observations, indicate that the species is neither a freshwater, nor a true marine gastropod.

It was found that the animals could be both smothered and drowned; that it was quite tolerant to both fresh and salt water, yet would climb out of either when immersed. The species needs considerable moisture, and moves about seeking shelter when exposed to desiccating wind and sun.

The natural ecological niche, at and above the high-tide level, on the damp substratum beneath the densely matted *Salicornia*, gives this snail the necessary moisture and protection. These flats are only submerged for a few hours each year during the extreme flood tides, and the species obtains at least as much moisture from fresh water as salt water in the form of rain and dew.

The range is rather restricted, the species being found only on a few of the *Salicornia* flats around Humboldt Bay in extreme northern California.

SMALL PELECYPODS: HOW TO IDENTIFY THEM. Dr. A. Myra Keen.
Read by Miss Elaine Reeves in the absence of Dr. Keen.

(Abstract)

Study of the hinge is essential in the identification of the small bivalves, whether of mature forms or the juveniles of normally large kinds. This is facilitated if one prepares a set of camera lucida drawings, which may be only diagrammatic sketches; but a picture of some kind is essential. A microscope with a camera lucida attachment is thus almost a necessity.

A recent critical review of West American genera of bivalves leads to the conclusion that several are erroneously attributed to this area. It is proposed to reject *Erycina*, *Lepton*, *Pseudopythina*, and *Sportella*, all European groups of which the type species are markedly different from West American forms. Most species so allocated must be redistributed, mainly into *Montacuta* Turton, 1822, and *Orobitella* Dall, 1899 (which may prove to be a subgenus of *Neaeromya* Gabb, 1873). One genus, *Halodakra* Olsson, 1961, can be added to the Californian fauna, for the species *Psephidia brunnea* Dall, 1916 apparently belongs here.

Two nomenclatural changes for genera of small pelecypods have already been pointed out by Vokes but may be worth repeated mention: *Huxleyia* has priority over *Cyrella* (both A. Adams, 1860) and replaces *Pleurodon* Wood, 1840, preoccupied. *Pristes* Carpenter, 1864, must be restored to validity, for it is not, as supposed, preoccupied by *Pristis*. *Serridens* Dall, 1899, falls, accordingly, as an unneeded replacement name.

James Lance asked for information on the Cephalaspid Opisthobranchs, particularly the genera: *Aglaja*, *Retusa*, *Valvulla*, *Philine*, *Cylichna* and *Diaphana*. Anyone having a collection of any of these genera (from the Pacific Coast of North America) is requested to contact him at Scripps Institution of Oceanography, La Jolla, California.

MOLLUSKS OF COCOS ISLAND. (illustrated) Dr. Leo G. Hertlein. No abstract submitted.

SOME SPECULATIONS ON THE CLASSIFICATION OF CHITONS.
(Illustrated) Spencer Thorpe, Jr.

(Abstract)

Pilsbry, Smith and Bergenhayn have suggested various classifications of the class Loricata. These classifications have been based primarily on the characteristics of the valves. In Thiele's classification the radula and girdle, as well as the valves, are considered.

Certain features of the radula musculature suggest that living chitons should be placed in three main groups. The genera and families within these groups correspond to Thiele's main scheme. Revision of the position of the genera *Cryptochiton* and *Katherina* is suggested.

Finally paleontological and morphological evidence is considered and a possible family tree constructed for the class Loricata.

The afternoon session opened with Miss Elaine Reeves reading Dr. A. Myra Keen's paper—

BEFORE LINNAEUS. (illustrated)

(Abstract)

Linnaeus' contribution was not simply a system of nomenclature, useful as this was. He also provided a concise index to a considerable body of literature and by his shrewd choices determined which of many competing names should apply to each recognizable form. Thus one name and one only would become valid for each.

In the molluscan portions of the "Systema Naturae," Linnaeus cited, altogether, forty works in which were to be found illustrations of shells. The earliest of these was by P. Belon, 1553. There were seven works prior to 1650, ten from 1650 to 1700, and 23 from 1700 to 1758. If any single book were to be selected that seemed, more than others, to have influenced Linnaeus in the conventions he adopted, it would probably be that of G. E. Rumphius, whose "Amboinische Rariteitskammer" in 1705 set a whole new pattern in zoological research.

E. P. Chace showed pictures contained in an album of early conchologists. Another paper presented was the—

GENUS *MACOMA* ON WEST COAST OF NORTH AMERICA—A PROGRESS REPORT. Paul C. Schroder. No abstract submitted.

After a short recess the business meeting was called to order by Chairman Talmadge at 3:10 P.M.

It was moved, seconded and carried that the minutes of the 1961 annual meeting at Goleta be accepted as printed in the 1961 Annual Report of the AMU.

An incomplete treasurer's report was given by Mary Long, showing a balance of \$258.34. It was moved, seconded and carried that the treasurer's report be accepted.

Dr. Stohler moved that members of the AMU-PD in good standing be entitled to a reduction in the registration fee when attending the annual convention, the amount of the reduction not to exceed the amount of the annual assessment collected. Lucille Zellers further moved that the secretary place on the mailing list the names of regularly registered guests and visitors. Seconded by Crawford Cate and carried.

A motion was made by Dr. Stohler, seconded by Ned Baker, that we memorialize the parent organization to the effect that it is recommended that the national secretary be compensated on a per capita basis, tied to a fixed percentage of the annual membership dues, whether or not the secretary is able to attend the annual meeting of the AMU. Carried.

Allyn G. Smith, seconded by Crawford N. Cate, presented the following resolution: Resolved that the AMU-PD in annual meeting on June 29, 1962 recommend that Dr. Albert R. Mead, incoming national AMU-PD president, be designated the official AMU representative to the First European Malacological Congress to be held in London in September 1962, and that appropriate action to this end be taken by the national AMU organization in its annual meeting to be held in St. Petersburg in August 1962; and in the event Dr. Mead is unable to serve that Dr. Robert Robertson be designated in his place. Carried.

Fay Wolfson moved, seconded by Dr. Stohler, that the AMU-PD recommend to the Department of the Interior and our Federal Congressman that, in the interests of preserving the marine fauna of the Pt. Loma reef, the Department investigate the feasibility of moving the outfall of the Saline Conversion Plant at least 1,000 feet off shore. Motion carried.

Dr. Stohler, chairman of the nominating committee, presented the following slate of officers for 1963:

CRAWFORD N. CATE	Chairman
DR. A. MYRA KEEN	Vice-Chairman
RUTH FRENCH	Secretary
FAY WOLFSON	Treasurer

It was moved and seconded that we adopt the slate of officers as proposed by the nominating committee. Carried.

The secretary was then instructed to cast a unanimous ballot for the officers.

The secretary reported 88 persons as having registered. The meeting was then adjourned until Saturday morning.

The annual banquet, attended by 96 persons, was held in the dining hall on the Asilomar grounds Friday evening.

Table arrangements, decorations and favors were made by a group from the NCMC under the direction of Hazel Jeschien, Chairman.

Bob Talmadge introduced and thanked several persons from the NCMC

and SVCS for their cooperation, combined efforts and hours of work, which made this a successful meeting.

The group later assembled in the Chapel, where all the activities were centered during the annual meeting, to view—

KODACHROMES OF THE CYPRAEIDAE. Ray Summers.

(Abstract)

Eleven slides in color of live shells with the mollusk extended were shown of the following species: *Voluta caroli*, *grayi*, *elliotti*, and *damoni*, *Cypraea tigris*, *comptonii*, *moneta*, *lutea*, *helvola*, and *reevei*, and *Calpurnus verrucosus*.

The photography above was done by Mrs. Val Davies of N. S. Wales, Australia with the exception of the *C. reevei* which was by Barry R. Wilson of S. W. Australia.

Following the showing of the above slides, approximately fifty more slides in color were shown. Among them were such rare species or races as *Cypraea nivos*a, *venusta episema*, *ostergaardi*, *marginata*, *thersites contraria*, *saulae nugata*, *pulchra*, *guttata*, *hirasei*, *teuleri*, and *camelopardalis*.

Walter Eyerdam also entertained us with his commentary on "A Biological Excursion to Panama." He described collecting conditions, persons with whom he made contacts, what his findings were, and the various places where he was able to collect.

Saturday morning found us all a little reluctant to start the day as we knew we would soon be going our separate ways, perhaps not to meet again for another year. However, we were soon very much alert, when Bob Ames began to talk and to show kodachrome slides of his pets, the Nudibranchs and Opistobranchs. These animals, among the most beautifully colored in the sea, have been captured in all their beauty by Bob and his camera.

At the conclusion of Ames' talk, Bob Talmadge presented the gavel to Crawford N. Cate, and after a few remarks from our new Chairman the AMU-PD, 1962 annual meeting adjourned.

A few highlights of the meeting should be observed at this point.

Several displays were set up in the Chapel so that they could be enjoyed at the leisure of the group. Bob Talmadge had an Australian abalone display, many species of which are not found in our major museums. John and Rose Burch displayed an *Olivella* collection. Jean and Crawford Cate showed "*Conus* Species from Hawaii." Their exhibit represented all the *Conus* species from Hawaii with exception of *Conus smirna* Bartsch and Rehder (a unique specimen), and a few species known only from dead-collected specimens. Mrs. Henrietta De Vore had a collection of Okinawa shells, while Hazel Jeschien displayed a "Sailor's Valentine," possibly 150 years old. Helmut Meier had a collection of sculptured molluscs with natural shells. These are exact reproductions of molluscs, made from a material developed by Mr. Meier and painted with oil paints. He has sold many of these models to museums. "The Veliger"—Volume 1 through Volume 4—was displayed by Dr. Stohler. AMU bulletins from 1948–1961, together with several mounted group pictures of the past meetings and samples of shell stationery were displayed by Lucille Zellers.

Cookies and coffee were served at midmorning and midafternoon sessions

by Elsie Hutson SVCS, Gladys Archerd NCMC, and their respective committees.

Upon arrival at one's room, an abalone shell mounted on colored paper with the words "Welcome, AMU-PD" and the person's name, was found hung on the door knob with colored yarn. Tiny flowers had been tucked inside the curve of the shell, which made this a welcome sight indeed. These were done by the Sacramento group.

In spite of the good fellowship feeling which prevailed throughout the meeting, members who had been with us in past years were greatly missed; Dr. A. Myra Keen, Dr. S. Stillman Berry, Dr. Albert R. Mead, John Fitch, Dr. Homer King, John Strobeen, George Kanakoff and others. We hope to have the pleasure of their company and knowledge at our future meetings.

Respectfully submitted by
Lucille Zellers, Secretary
American Malacological Union,
Pacific Division

REGISTRATION, 1962 AMU—PACIFIC DIVISION MEETING

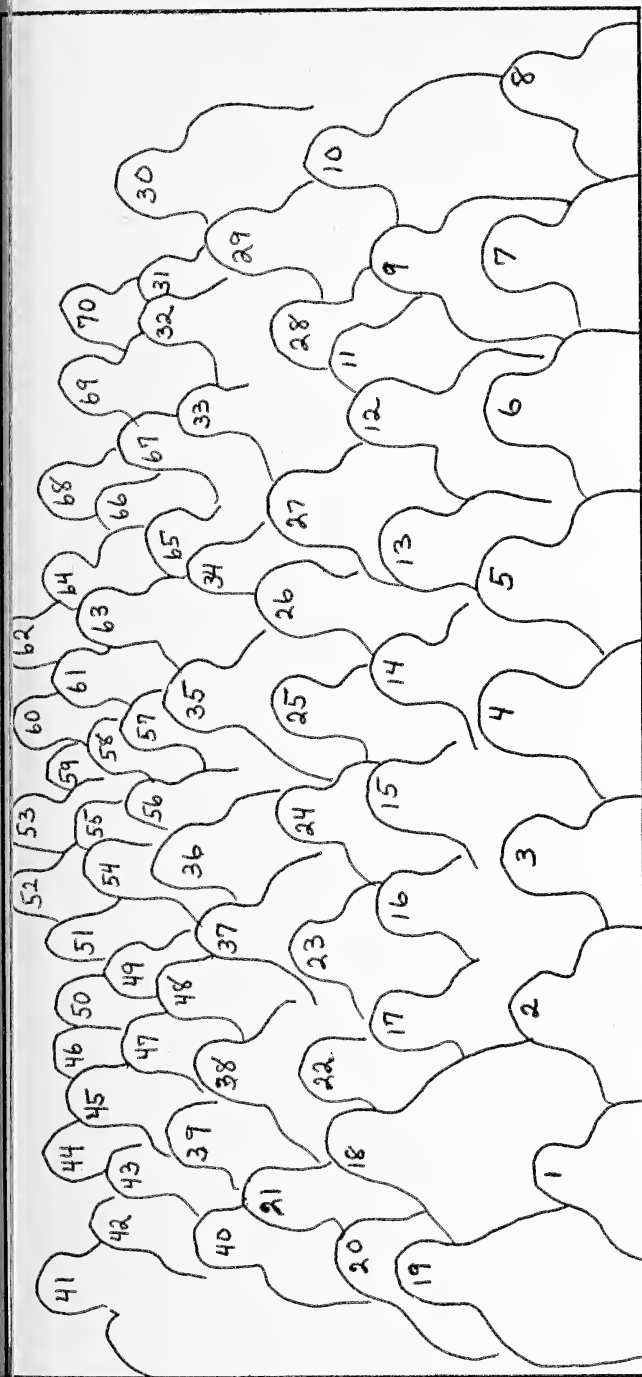
W. O. Addicott, Menlo Park, California
Mrs. Robert R. Alexander, La Mesa, California
Robert F. Ames, Oakland, California
Mrs. Russell Archerd, Berkeley, California
Mr. and Mrs. E. P. Baker, Downey, California
Mr. and Mrs. Harold Baker, Sacramento, California
Mrs. R. G. Beck, Santa Barbara, California
Mr. and Mrs. John Q. Burch, Los Angeles, California
Helen Burton, Oakland, California
Alice Burton, Oakland, California
Mr. and Mrs. Crawford N. Cate, Los Angeles, California
Mr. and Mrs. E. P. Chace, San Diego, California
Mrs. Bibi Chapman, Berkeley, California
Eugene Coan, Los Angeles, California
Mrs. Henrietta De Vore, New Cuyama, California
Walter J. Eyerdam, Seattle, Washington
Mrs. Bertha Finke, Sacramento, California
Mr. and Mrs. Howard Fletcher, Redlands, California
Miss Effie R. Forthun, Seattle, Washington
Mrs. Irene Franchini, Tranquility, California
Mr. and Mrs. Mead French, San Pedro, California
Mrs. Frank E. Good, San Diego, California
Mr. and Mrs. Hiram Goodwin, Albany, California
Dr. Wendell O. Gregg, Los Angeles, California
Mr. and Mrs. Edgar Hailey, Oxnard, California
Dr. Leo G. Hertlein, San Francisco, California
Mrs. Lucile Hoskins, Harold and Christine, Healdsburg, California
Mrs. Helen Hunt, Berkeley, California
Mrs. Elsie C. Hutson, Sacramento, California
Mr. and Mrs. Lewis Howard, Santa Barbara, California
Mrs. Otto Jeschien, Berkeley, California
Dr. Alan J. Kohn, Seattle, Washington
Hazel Kolb, Healdsburg, California
Elsa Kops, Venice, California
Patrick I. La Follette, Huntington Park, California
James R. Lance, San Diego, California
Mr. and Mrs. Douglas Larson, Concord, California
Mrs. Charles Lewis, Webster Groves, Missouri
Mary E. Long, Sonora, California
F. Sterns MacNeil, Menlo Park, California
Louie Marincovich, Los Angeles, California
Mrs. Ann P. Marti, Balboa, Canal Zone
Mr. and Mrs. Hall Meier, Escondido, California
Walter B. Miller, Malibu, California
Roy L. Morrison, San Diego, California
James McLean, Stanford, California
Pete Oringer, Los Angeles, California

Jens M. Ostergaard, Mountain View, California
Marianna Paulson, Berkeley, California
Elaine Reeves, Menlo Park, California
Mae Dean Richart, San Francisco, California
Charles Riddle, Sacramento, California
Captain R. D. Risser, Monterey, California
Charles and Frank Russ, Alameda, California
Allyn G. Smith, Berkeley, California
Dr. and Mrs. V. D. P. Spicer, Centralia, Washington
Mrs. Katherine Spohn, Bellflower, California
Gale Spohn, Jr., Santa Barbara, California
Dr. Rudolf Stohler, Berkeley, California
Ray Summers, Petaluma, California
Robert R. and Robert C. Talmadge, Willow Creek, California
Spencer Thorpe, Jr., El Cerrito, California
John G. Vedder, Menlo Park, California
Mrs. Raymond Webb, Chula Vista, California
Mr. and Mrs. Jay A. Weber, Miami, Florida
Jan Wigley, Centralia, Washington
Evelyn Wilson, Oakland, California
Estelle Windhorst, Webster Groves, Missouri
Mrs. Fay Wolfson, San Diego, California
Lucille Zellers, El Cerrito, California



AMU PACIFIC DIVISION MEETING

JUNE 27 - 30, 1962



1. Emery P. Chace, 2. John Q. Burch, 3. Mary E. Long, 4. Lucille Zellers, 5. Robert W. Talmadge, 6. Crawford N. Cate, 7. Elaine Reeves, 8. Irene Baker, 9. Evelyn Meier, 10. E. P. Baker, 11. Charles Riddle, 12. Harold Hoskins, 13. Christine Hoskins, 14. Hazel Kolb, 15. Effie Forthun, 16. Evelyn Wilson, 17. Elsa Kops, 18. Wendell O. Gregg, 19. Ruth French, 20. Mead French, 21. Walter Eyerdam, 22. Gladys Archard, 23. Jens M. Ostergaard, 24. Elsie Chace, 25. Irene Franchini, 26. Henrietta De Vore, 27. Lucile Hoskins, 28. Rudolf Stohler, 29. Hall Meier, 30. John Saxby, 31. Mrs. Jay Weber, 32. Jay Weber, 33. R. D. Risser, 34. Jan Wigle, 35. Jean Cate, 36. Rose Burch, 37. Phil Spicer, 38. Patrick La Follette, 39. Eva Mae Fletcher, 40. Roy L. Morrison, 41. Ray Summers, 42. Frances Lewis, 43. Barbara J. Good, 44. James McLean, 45. Mrs. Edgar Hailey, 46. Edgar Hailey, 47. Amzel Spicer, 48. Bertha Finke, 49. Fay Wolfson, 50. Howard Fletcher, 51. James Lance, 52. Mrs. Harold Baker, 53. Harold Baker, 54. Elsie Hutson, 55. Hazel Jeschien, 56. Mae Dean Richart, 57. Grace Alexander, 58. Kathryn Spohn, 59. Gale Spohn, Jr., 60. Faye Howard, 61. Eugene Coan, 62. Allyn G. Smith, 63. Myrtle Beck, 64. Robert C. Talmadge, 65. Mary Larson, 66. Kay Webb, 67. Doug Larson, 68. Leo G. Hertlein, 69. Ann Marti, 70. Alan J. Kohn.

NOTES AND NEWS

Another "first" was staged at the St. Petersburg meeting when representatives of ten local shell clubs held two informal meetings to exchange ideas. Among topics discussed were those concerned with raising money for operating funds (shell auctions; shell shows for which an admission fee is charged); program ideas combining entertainment and instruction (topical movies, visiting lecturers, observation period, shell-of-the-month, identification of shells); civic enterprises (permanent exhibits, traveling collections, school collections); field trips. A novel idea was a recent activity of the Sanibel-Captiva Shell Club which staged the first "shell count," modeled after the Audubon bird census.

The second session was devoted to shell shows and the many problems which they present. Dr. R. Tucker Abbott is working on a guide which will suggest standardization of classes, rules for exhibitors and judges, etc.

Informal symposiums such as this one may well become an established part of future AMU meetings. Please send any ideas on the subject to Mrs. Henry E. Nickerson, Box 2342, Captiva, Florida.

THE 1963 ANNUAL MEETING

The American Malacological Union will meet in Buffalo, New York, on June 18 through June 21, 1963. The Buffalo Museum of Science and the Conchological Section, Buffalo Society of Natural Sciences, are co-hosts.

Meetings, midday meal and the annual banquet will be held at the Museum with housing plans to be announced at a later date. As on occasion of the two earlier Buffalo meetings, the field trip will be a tour of Niagara Falls with collecting at Niagara Glen or on the shore of Lake Ontario. A second trip to Eighteen Mile Creek, famed for fossils, may be arranged for paleontologists if enough interest is evinced.

Details and rates will be supplied to all AMU members early in 1963, and all are urged to include this meeting in their vacation plans.

PACIFIC DIVISION MEETING

The 1963 meeting of the Pacific Division of the American Malacological Union will be held on the campus of the University of California at Santa Barbara, June 26 through June 29 inclusive. Anyone interested in malacology or conchology is welcome to attend. Non-members of AMU who wish to be placed on the mailing list of the Pacific Division may send their names and addresses, together with 50 cents, to Mrs. Fay Wolfson, Treasurer, 3336 Poe Avenue, San Diego 6, California.

As we anticipate a large attendance, all who plan to attend are urged to send in their reservations as soon as possible. Many interesting papers have been promised, and several overseas collectors have indicated plans to be with us this year. You may meet some of your foreign correspondents for the first time. Don't miss this meeting!

CRAWFORD N. CATE, *Chairman*
Pacific Division, AMU

AMU MEMBER CLUBS

PACIFIC NORTHWEST SHELL CLUB, Tom Rice, Editor: We have been very active in this Worlds Fair year 1962, starting out with a banquet to commemorate our first birthday. Now that our second anniversary is nearing we can boast a membership of nearly 250 persons in twenty states and some fifteen foreign countries.

Because of the long distances involved, many of our members are unable to attend our meetings and so our newspaper "The Pacific Northwest Shell News" has proven a worthwhile way to keep our membership in touch.

Shell auctions were held at the March and September meetings in Olympia, Washington and thus our club treasury was given quite a boost. Because of the Fair, the club sponsored an exhibit of local shells at Jonas Brothers of Alaska in downtown Seattle, an attraction which proved popular with visiting shellers. In July a week-long collecting trip was held at Mukkaw Bay; weather and good collecting combined to furnish a fine time for all who participated. Our Shell Fair scheduled for this October has been postponed until the Spring of 1963.

We feel very fortunate to have the noted malacologist, Dr. Alan J. Kohn of the University of Washington, as a member of our club; he has made himself available to our many inquiries concerning mollusks.

Meetings are held every other month on the second Sunday; for information write either Mrs. Marshall (2237 N.E. 175th, Seattle 55) or Tom Rice (Route 2, Box 483, Paulsbo, Washington). Officers for 1962: President, Salle Snyder; Vice-President, Ralph Jones; Recording Secretary, Dorothy Jarosek; Corresponding Secretary, Elsie Marshall; Treasurer, Harvey A. Johnson; Editor, Tom Rice.

CONCHOLOGICAL CLUB OF SOUTHERN CALIFORNIA, Bertram C. Draper, Secretary: Our Club meets at 7:30 P.M. on the first Monday of each month in the auditorium of the Los Angeles County Museum. Highlights of the past year include talks by A. Myra Keen, Allyn G. Smith, John E. Dupont, and Baldomera Olivera, former Editor of "The Philippine Shell News." Southern California speakers rounded out the widely varied programs. Shell displays, color slides and films were used effectively with these presentations.

The many fine displays of shells became more enjoyable on new lighted display tables. We have seen many new ideas and techniques for making attractive collections. These displays have become an important part of our club activities.

Collecting trips to many areas were reported. The Gulf of California was the most visited and most rewarding in specimens. Our own Southern California coast was not forgotten and the quality of the shells collected here seems to be improving as pollution is reduced.

Our thanks go to our Editorial Board, composed of John Fitch, Crawford and Jean Cate, and Joe Dushane, for many hours devoted to the CCSC section of Western Shell Club News. We are also proud of the thirteen articles published in "The Veliger" by members of our club.

Our total membership at midyear was an even one hundred. Attendance at meetings ranged from thirty-nine to eighty-one. Officers of our club for 1962 are: President, Bruce Campbell; Vice-President, Helen Dushane; Secre-

tary, Bertram Draper (succeeding Virginia McClure in July); Treasurer, Ruth Richmond.

THE KAUAI SHELL CLUB, June H. Humme, Secretary: We meet the second Thursday of each month at the Wilcox Hospital Library, Lihue, Kauai, Hawaii. Our program is varied to interest the local collectors. The current project is the building of a display of Hawaiian (particularly Kauai) shells for the Kauai Museum. The Kauai Shell Club donates, catalogues and arranges the shells in cases provided by the Museum.

There were twenty-nine members on July 30, 1962. The officers: President, Barrie Cooper; Vice-President, John Duarte; Secretary, June H. Humme; Treasurer, Betty Black. Dues are one dollar per year, we have no club publication.

CONNECTICUT SHELL CLUB, Sheldon Morris, Secretary: Our club meets at 8:00 P.M. on the second Friday of each month in the Peabody Museum, New Haven, Connecticut. The current officers are: Percy Morris, President; Frances Thompson, Vice-President; Sheldon Morris, Secretary; William Tut-hill, Treasurer.

Following a brief business session, we are entertained by a guest speaker, or by a prepared talk by one of the members, or an accounting of a trip which may be as much a travelogue as a talk on mollusks. If no official program has been scheduled, our president Percy Morris will sometimes have shells from the Peabody Museum collection for group study. Whatever the feature, there is always time for informal discussion to complete the evening.

CONNECTICUT VALLEY SHELL CLUB, Helen B. Burt, Secretary: Another wonderful and happy year of interesting and stimulating meetings and field trips has terminated. We welcomed five new members and have enjoyed several visitors. Officers serving for 1962-63 are Raymond Robert, President; Earl H. Reed, Vice-President; Helen B. Burt, Secretary; Ruth Warren, Treasurer. Our club meets the second Monday of each month in the lapidary room of the Museum of Natural History, Springfield, Massachusetts.

We made three home visits which proved to be exceptionally interesting. Mrs. Martha Menard of Windsor, Connecticut displayed both shells and minerals; Henry and Nellie Dow of Springfield lectured with slides on "Shelling in the Virgin Islands and Puerto Rico" and Austin and Ruth Warren talked about "Island Hopping for Shells in the Virgin Islands, Sanibel and Jekyll Islands." Two informative talks were given by Earl H. Reed, Curator of Geology and Astronomy in the Springfield Science Museum on "Marine Shells of the South African Coast" and "Some Rare Shells of the Western Atlantic." The latter paper was followed by a discussion of the meaning of "rare" shells. Our annual Christmas party was held at the home of Elizabeth Thomas and featured an exchange of shells.

Plans are being made for frequent field trips in our locality for freshwater and land mollusks; in the past year collecting trips have been made to Sea Gull Beach at West Yarmouth, West Dennis Town Beach, Kalmus Park at Hyannis and Chatham Beach. If you are ever our way, do pay us a visit.

THE SAN ANTONIO SHELL CLUB, Myra Taylor, Secretary: Our club meets the fourth Monday of each month at the Laurel Heights Methodist

Church—7:30 the time. Officers: President, Barbara Halbardier; Vice-President, Maurine MacFarland; Treasurer, Cleta Mahavier; Secretary, Myra Taylor.

Members have contributed shells from the Texas coast for the Witte Museum. Talks on shells are given by members and by guest speakers, among the most outstanding was that of Dr. Thomas Pulley of Houston accompanied by a film taken on a submerged coral reef off the Texas coast. Live shells, shells in art and literature were discussed, films from the Fish and Game Commission were enjoyed. A gold cup for special award was won by members for an exhibit at the Fort Sam Houston Hobby Show. Quarterly editions of the Texas Shell News were published, and at each meeting a shell is given as a door prize. Finally, thirty members participated in a shell hunting expedition to Aransas Pass and Port Aransas, Texas. It was an informative and entertaining year.

THE PALM BEACH COUNTY SHELL CLUB, Mrs. William W. Hughes, Corresponding Secretary: Our program for 1961-62 began in June with "The Place of Mollusks in the Animal Kingdom," William Ross. West Palm Beach opened a Junior Museum, and Mrs. Virginia Lee with the assistance of other club members worked on the marine biology display. July: Dr. R. Tucker Abbott addressed the club on the subject of his expedition to the Philippines, and a fossil collecting trip to Lake Okeechobee was very successful. August: *Seafari*, an original name for field trips was introduced, and we have a patent pending on it as the name for our publication. Jay Jarrett, a professional photographer, spoke on photographing shells. September: *Seafari* to Peanut Island well attended and successful. Muriel Hunter of Miami spoke on the subject of fossils. October: Report by members of their out-of-state shelling trips. November: Viewing of the collection of Mrs. F. Joseph Cudahy of Chicago, at the Society of Fine Arts in Palm Beach. January: Election of officers; display of live mollusks. February: Bill Hughes and Harold Gordon displayed fine collections of shells at the South Florida Fair. Our Third International Shell Show was held for five days, exciting, beautiful and well attended. Mrs. Carrie Chevalier won the Philadelphia Academy Award for her educational display. March: Shell auction held to benefit the club treasury. Mrs. Virginia Lee was official identifier for Skin Divers of America at their convention. April: "The Tropical Pacific," Dr. F. M. Bayer. A field trip held including a visit to a new museum in Stuart. May: Two good field trips to Bear Cut in Miami, and at the meeting "Coral Wonderland" by Mrs. Ward Brown. June: Local underwater film by Bobby Spearman. An award of money and a plaque was voted to be awarded to the winner of the best exhibit on marine biology by a student at the 1963 Science Fair. Two fine Florida shell collections given to the local schools and a large case and collection loaned to the Lake Worth Public Library.

THE JACKSONVILLE SHELL CLUB, Mrs. Robert Stacy, Recording Secretary: Our club is two years old. Meetings are held on the fourth Thursday of the month at the Lakeshore Presbyterian Church, Jacksonville, Florida. Our officers: President, Mrs. E. W. Eubanks; Vice-President, Albert Raven; Recording Secretary, Mrs. Robert Stacy; Corresponding Secretary, Mrs. Edwin Hicks; Treasurer, Mr. H. M. Stevens.

The interests of the members is varied, ranging from paleontology to malacology. All are active collectors, mud no deterrent; some dredging has been attempted. Membership card carries cut of *Junonia* drawn by a member. Programs are as varied as our interests, as these titles suggest:

"Methods of Shelling in this Area"; "Coweries—habits—where to find them"; "Invertebrate fossils"; "The salt water aquarium"; "Color slides of Australian Shells"; "Identification Clinic"; "Conservation."

A six-page newsletter, The Shell-o-Gram, is printed monthly. Each issue features drawings and scientific information about a "Shell of the month." Extracurricular activities have included a shell display at the Greater Jacksonville Fair, an underwater movie presented to the public, field trips to local areas and the annual Christmas banquet and exchange of shells. A fitting climax to our year was our shell fair held the last two days in July, judged by Dr. William Clench, Mrs. Selma Lawson and Mr. James Donovan. It was a great success and brought us new members.

THE ST. PETERSBURG SHELL CLUB, Edna Marcott, Corresponding Secretary: Our 1961-62 meetings were held on the 2nd and 4th Friday of each month, November through March, at the St. Petersburg Junior College. The following talks were well received:

"Why Such Funny Names?" Dan Steger; "Prospecting for Shells," Robert Lipe; "Marine Conservation," Dr. Robert Hutton; "Marine Biology at the University of South Florida," Dr. Gerald Robinson; "Coral Wonderland," a 30-minute film on the Great Barrier Reef; "A New Look at Busycon," Roger Dunn; "Life Cycle of Mollusks," Dr. George Reid; "Nassau Holiday," Dorothy Hanssler.

Our Educational Committee headed by Mrs. Francis Smith has sent out 26 scientific collections of over 100 labeled species each, to high schools, one special school (for the blind), grade schools and student collections—all this during the 1961-62 season.

We are very fortunate to be co-hosts with Florida Presbyterian College to the American Malacological Union and all worked on plans for what we hope will be their best and biggest meeting ever.

Our shell show in February received many favorable comments. Judges were Dr. Joseph P. E. Morrison, Dr. Gilbert Voss and Dr. George Reid. The Hanssler family won the Smithsonian Award for their beautiful worldwide collection.

These officers were elected for 1962-63: President, Dorothy Hanssler; Vice-President, Percy Slinn; 2nd Vice-President, Robert Lipe; Treasurer, Roger Dunn; Recording Secretary, Barbara Steger; Corresponding Secretary, Edna Marcott; Councillors-at-Large, Dr. Francis Smith, Mrs. Robert Lipe.

CONCHOLOGICAL SECTION, BUFFALO SOCIETY OF NATURAL SCIENCES, Eunice A. Potter, Secretary: Shell enthusiasts have been busy on the Niagara Frontier since August 1961. The high point of our year was the program at our annual banquet in October when Dr. John F. Storr, Biology Professor at University of Buffalo, related his summer experiences as underwater photographer in the Bahamas. He is an excellent chalk artist, pointing out traits of various sea life and thus making more meaningful his two-color movies, "Living Mollusks" and "Pastures of the Sea." A most schol-

arly paper was presented by our past president, Eugene Musial, on "Fresh Water Pearls." Like our forests, most of the pearl bearing mussels, once a million-dollar-a-year industry, are gone. "Beach Combing in Southern California" was presented by Mrs. Vallone, whose family had prowled that rocky coast on their vacation. Miss Becker, a veteran member, brought a part of her "Cypraea" collection and took us round the world with their stories. Mrs. Plummer appeared on the Museum TV hour with many of her unusual corals and mollusks.

Mrs. Ashbery, Mrs. Holdway and Mr. Schmeck attended the AMU meeting in Philadelphia. At least nine members have combed the beaches of the Southeast from Myrtle Beach, S. C., to the Florida Keys and Sanibel. Five found interesting live specimens in New England and the Maritimes, one visited the Saguenay Country, Quebec, and two combed the beaches of Upper Lake Michigan, Lakes Huron and Ontario for freshwater mollusks.

The geology of Niagara country was opened to its lowest depths by the skillful guidance of Miss Carol Heubusch, paleontologist of Museum staff.

In May, the members pooled their outstanding specimens into a two-weeks shell exhibit at the Museum and in June held a miniature shell fair at the home of one of our members whose parents once operated a hotel on Captiva Island.

Our growing library, begun a year ago, is now a matter of pride. It makes possible a great scientific opportunity for members, few of whom can afford to purchase individual copies. Landlubbers all, we never miss a chance to travel to existing seas or hunt fossils in our local quarries and streams.

Our meetings are open to all shell lovers. We meet the 3rd Friday of each month (July, August and December excepted) at 8:00 P.M. at the Museum. Our current roster includes 31 active members.

The 1962 officers are: Honorary President, Mrs. Fred Hoffman; President, Mrs. Peter Plummer; Vice-President, Miss Mildred McChesney; Secretary, Mrs. A. Leslie Potter; Treasurer, Miss Louise Becker; Librarian, Mrs. Morley Bishop.

THE HAWAIIAN MALACOLOGICAL SOCIETY, Thelma Rappold, Corresponding Secretary: At the 1961 annual election, these officers were elected to serve during 1962—President, E. R. Cross; Vice-President, James L. Dennis; Recording Secretary, Mrs. Robert O'Brien; Corresponding Secretary, Thelma Rappold; Treasurer, Don von Geldern. Because of poor health Mr. Karl Greene resigned as Editor of Hawaiian Shell News and Mr. E. R. Cross has assumed the editorial duties. We meet the first Wednesday of the month in Waikiki Aquarium. This was our 1961-62 program: November, election of officers. December, "Cerithidae in Hawaii," David Boynton. January, "Shell-ing in the Major Cities of Europe," Thomas Shields. February, a lecture by Dr. Tom Richert on his recent trip to Samoa. March, "Sea Shore Oddities"—a film. April, New Constitution and Bylaws adopted. May, two award-winning films by Ron Church, professional diver. June, lecture on fossil shells by Dr. Ralph Moberly, Professor of Geology at University of Hawaii. July, "Giant Submarine Pipeline," Mr. E. R. Cross' prize-winning movie. August, report on recent collecting trip to Philippines by Bobbie Lee. September, shell auction.

In January, 1963, we shall hold our 5th annual shell fair, Mrs. Mary Eleanor King to be in charge.

SANIBEL-CAPTIVA SHELL CLUB, Maude W. Nickerson, Vice-President: Organized in March of 1961 with 27 members we now have 145, two-thirds of whom are winter residents or visitors.

Programs have consisted of talks by members on selected gastropods, i.e., *Strombus*, *Melongena*, *Crepidula*, *Voluta*, *Natica*, *Busycon*, *Fasciolaria* and *Conus*. Dean Hollister of Cornell gave us a layman's view of the fossil world and showed the differences between some fossil and contemporary shells using a member's collection for his talk. Harvey Meyers, Kathleen Johnstone and Dr. R. Tucker Abbott were other speakers.

Using slides, Mrs. Joseph Hillman spoke on "Strange Shells and Their Stories"; Dan Steger spoke on Turridae, and Maude Nickerson on her shelling experiences around the Pacific. At a Christmas party there was a shell exchange.

Most successful was a shell count in January when some 70 men and women braved the cold of an early morning low tide to bring in 128 species.

The Club gave an hour briefing to some 60 members of the Girl Scout Leaders Workshop and then took groups out on field trips. Later a smaller version of the same was given a Girl Scout Troop from Bradenton.

Two display cases in the Collier Arcade in Ft. Myers were revamped and labeled, a display has been prepared for the Lee Co. Chamber of Commerce and displays are being prepared for the Florida Welcome Stations.

The Club is also sending west coast of Florida shells to the American Museum of Natural History in New York to round out their collection.

Two News Letters have been sent out. An important event was the publication and distribution of 5,000 copies of our SHELL HANDBOOK "Conservation, Collecting, Cleaning." Another issue of 10,000 will be on the presses shortly.

Meetings are held every month except September (threats of hurricanes keep visitors away) and alternate between the Sanibel and the Captiva Community houses. Visitors from many other clubs come and everyone is always welcome.

Officers are Mrs. Mary Aleck, 1st Vice and Acting President (Sanibel); Mrs. Henry E. Nickerson, 2nd Vice-President (Captiva); Mrs. J. C. McCaul, Recording Secretary (Captiva); Mrs. John P. Glass, Corresponding Secretary, and Mrs. Paul F. Kearns, Treasurer.

THE PHILADELPHIA SHELL CLUB, Ronald D. Lowden, Jr., Secretary: The seventh year of the club proved a busy one with many noteworthy programs presented: Dr. A. W. B. Powell (New Zealand Molluscan Fauna); Dr. H. B. Baker (Anatomy of Mollusks); Dr. R. Robertson (British Honduras Expedition); Dr. R. T. Abbott (History of ANSP's Dept. of Mollusks); Virginia Orr (*Polyplacophora*); and George and Mary Kline (Second Expedition to New Caledonia). In addition, there were monthly reviews of literature on mollusks, Shell-of-the-Month talks, resumption of the monthly sheet "Pandora Box" featuring Latin pronunciations, book sales, a Christmas party, and the annual donation auction (netting \$269). New this year were Vol. 1, No. 6, of the *Proceedings*, an exchange of publications with other clubs, continua-

tion of the shell exchange project, plans for a new series of shell classes before meetings beginning next Fall, and a field trip (held in June, establishing range extensions for *Littorina littorea* and *L. saxatilis*).

Membership for 1962 was 201. Officers elected for the 1962-63 season: Honorary Life President, Dr. H. B. Baker; President, Leonard Richardson; Vice-President, Robert J. L. Wagner; Secretary-Treasurer, Ronald D. Lowden, Jr.; Historian, Robert Robertson; Editor of the *Proceedings*, R. Tucker Abbott; Councillors, Ruth Ostheimer, Warner R. Over, John D. Parker, and Charles B. Wurtz. Meetings are held at 8:00 P.M., second Thursday of the month (September-May) at the Academy of Natural Sciences of Philadelphia. Back numbers of the *Proceedings* are obtainable at \$1.00 per copy, plus postage.

NEW YORK SHELL CLUB, William E. Old, Jr., Recording Secretary: On June 10, 1962, the New York Shell Club conducted its 110th meeting. The club meets on the 2nd Sunday of the month from September through June. Meetings are held in Room 319 of the American Museum of Natural History. Meetings are called to order at 2:00 P.M. From 1:00 until 2:00 P.M. an informal "Identification Clinic" is held.

The officers for the year 1962-63 are: Harold Feinberg, President; Josephine Wichern, Vice-President; Mathilde Weingartner, Treasurer; Grace McDougall, Corresponding Secretary; William Old, Jr., Recording Secretary; and Nick Katsaras, Historian. We have approximately 240 regular and corresponding members, here and abroad.

The principal guest speaker of the year was Miss Virginia Orr, of the Academy of Natural Sciences of Philadelphia. She spoke on "Collecting in the Indo-Pacific Province."

Members spoke on trips to Japan, Florida, Quebec, and New England. Two scientific papers are presented at each meeting. During the year we had several talks on *Conus*, pulmonates, and *Busycon*. Bill Old showed slides of Brazilian shells and Tony D'Attilio showed slides of shells from Zanzibar. Karl Jacobson gave several talks on shells of the New York area.

The club's treasury benefited by a highly successful shell auction in April. The annual field trip was held at Sandy Hook, New Jersey. Thirty-eight marine species were collected.

Projects of the club are compilation of a check list of the local molluscan fauna and assisting the museum in many ways.

The mimeographed "Notes" appear 10 times a year. Mrs. Dorothy Raeihle, the Editor, endeavors to have articles for the beginner, as well as ones for the advanced collector. Notes are sent at cost to corresponding members.

Popular features of the meetings are the "Shell of the Month," "Question Box," and "New Books and Publications." A "rare" book was displayed at the February meeting—it was the unique, bound minutes of the first 100 meetings of the NYSC!

SACRAMENTO VALLEY CONCHOLOGICAL SOCIETY, Wyllie Taylor, Secretary: This shell club of inland California celebrates its tenth anniversary this year. The membership remains at about forty, and meets in the most spacious homes of the members on the third Saturday of each month at 7:30 P.M.

Our officers of 1962 are: Mary Long, President; Victor Haack, Vice-President; Wyllie Taylor, Recording Secretary; Bertha Finke, Corresponding Secretary; Lois McMakin, Treasurer; Gladys Demuth, Librarian; Florence LaFayette and Elsie Hutson, Editors of the Collector.

The club has two honorary members, Mrs. Paul Steele, and Mr. C. M. Goethe. There are also two retired members.

Some of the club activities which have welded this club together are: group study at each meeting, films, lectures, auctions, sales and exchanges of shells, displays for the public, annual picnic and annual Christmas party.

At each meeting door prizes are given, one to the junior group, which has its own special meeting, and one to the adults.

The club maintains a growing, well-used library of shell literature and publishes a quarterly called "The Collector."

All visiting shellers are cordially invited to attend the meetings.

THE GREATER ST. LOUIS SHELL CLUB, Mildred M. Novak, Secretary:

We meet every third Wednesday of the month (with the exception of July and August) at 8:00 P.M. at a member's home where prepared papers are delivered and treasured old or new shells are exhibited and discussed. Our new officers for 1962-1963 are: President, Mr. Flynn Ford; Vice-President, Mr. Charles Hertweck; Secretary and Treasurer, Mrs. Charles Novak; Historian, Mrs. Charles S. Lewis; Publicity Chairman, Mrs. Robert Oswald.

One of the highlights of the 1962 season was our Shell Show and Auction. The \$355 realized from this enthusiastic endeavor was donated to the St. Louis Academy of Science. This was quite an accomplishment for a group as small as ours (only 30 active members). Being so far inland, we found it gratifying to see how many St. Louisans attended and expressed their interest in this fascinating and educational hobby.

Thanks to the hard work of our retiring president, Mr. George C. Henderson, we now have regular club stationery.

Our new president, Mr. Flynn Ford, and his wife Mary attended a number of Shell Shows in Florida earlier this year and captured quite a number of blue ribbons.

Mrs. Charles S. Lewis, accompanied by her sister, Miss Estelle Windhorst, are delegates again to the AMU, Pacific Division Meeting, after which they will travel throughout the West, South and Southeast of our United States to attend the 29th Annual Meeting of the AMU in St. Petersburg, Florida. We all await our September meeting anxiously for their glowing report of the enlightening nature of both meetings.

Our plans for 1962-1963 include Shell Show and Auction, as well as more interesting and informative meetings.

NAPLES SHELL CLUB, Mr. Lou Mason, President: Meetings on the second Thursday of the month, October through May, 8:00 P.M., at the Woman's Club. Officers are: President, Lou Mason; Vice-President, Mrs. Augusta Pond; Secretary, Mrs. LaVerne Weddle; Treasurer, Mrs. Edith Polly. Our Third Annual Shell Show (Feb. 22 through 25 with set-up day on 21st) was well received by the public. Competitive displays were in eleven categories including one in Shell Craft. First, second and third prize ribbons were

awarded plus a ribbon for Shell of the Show (*Spondylus americanus*) and another for Most Outstanding Beach Shell (*Conus aureofasciatus*).

One member, Mr. I. A. Wood of Punta Gorda (travel distance 70 miles each way) gave a most interesting talk on shelling in Hawaii where he and Mrs. Wood collected in 1930-37. His three boxes (26 species) of Hawaiian *Cypraea* received first prize at our Shell Show and took second prize at the world famous Sanibel Shell Fair in March.

Dr. R. Tucker Abbott was guest speaker at our March meeting. Our only publication is a souvenir issue of the Shell Show included in a magazine (circulation 10,000) called "Naples Guide"—all about Naples, Florida. Copies were sent to shell clubs but if any were missed, they should write to Lou Mason, 888 Fifth Ave. S., Naples, Florida, for a copy. Correspondence is invited and all shellers are urged to visit us whenever they are in this part of the Everglades.

BROWARD SHELL CLUB, Mrs. Terry Marsh, Secretary-Treasurer: Our club was organized in March, 1962 and now totals 37 members. We meet the second Wednesday of each month at 8:00 P.M. at the Cypress Plaza Community Hall, South Pompano Beach. Our officers are Mr. Earl Chesler, President; Dr. Grace Hunter, Vice-President, and myself as Secretary-Treasurer. The purpose of the Broward Shell Club is to further the study of shells, to collect shells, to share our interest, knowledge and ideas on the study and the collection of shells and, in the future, to establish a museum. Our annual dues are \$2.00 for adults and \$1.00 for Junior members 18 years of age and under.

We have had two shell hunts, our first in Bimini, Bahamas on April 20 and 21, our second at Bear Cut, Key Biscayne, Miami on May 20. Prior to going shelling we were privileged to have been granted permission to visit the Marine Laboratories at the International Oceanographic Foundation of the University of Miami. Dr. Don Moore escorted us on a guided tour of the Marine Lab. This was the highlight of our trip. Saturday, June 30, we are planning to go to Peanut Island near the Port of Palm Beach for our third shell hunt.

NATIONAL CAPITAL SHELL CLUB, Mrs. Richard Hagemeyer, Secretary: The National Capital Shell Club began its second year's activities with Gen. M. H. Silverthorn as President, ably assisted by Dr. Joseph P. E. Morrison, Vice-President; Mrs. Walter N. Carpenter, Secretary; Mrs. Carl I. Aslakson, Treasurer; Dr. Joseph Rosewater, Historian; and Dr. Earl Matthews and Dr. Harald A. Rehder on the Executive Committee.

Programs for the 1961-62 year covered a variety of subjects and were thoroughly entertaining as well as informative. They included a short illustrated report on the Tenth Pacific Science Congress by Drs. Rehder and Rosewater; a demonstration of night shelling techniques, with an emphasis on its hazards and rewards by Mr. Harris Dawson; illustrated reports on trips to the Tuamotus by Dr. J. P. E. Morrison and the South Pacific and Australia by Mr. William Blair; a report on a trip to Lebanon in search of host snails for the disease-carrying blood flukes; a spellbinding talk and color slides showing various shells from the Guam-Tinian area which had been placed in simulated natural habitats, by Mr. Norman Meese. The highlight of the

year was a talk by Mrs. George Kline, illustrated beautifully with slides, on two collecting trips which she and her husband had made to New Guinea.

Officers for the 1962-63 season are: Dr. Joseph P. E. Morrison, President; Harris P. Dawson, Jr., Vice-President; Mrs. Richard Hagemeyer, Secretary; Mrs. Carl I. Aslakson, Treasurer; and Norman Meese, Historian.

Meetings are held on the fourth Thursday of each month from September through May, in Room 43 at the National Museum.

GULF COAST SHELL CLUB, Anna Mae Bishop, Vice-President: Our club has just completed a very successful first year and we are looking forward to the months ahead with enthusiasm. We have a program or speaker at each meeting, a scientific report, a Shell of the Month, and, thanks to our president, a shell is presented as an attendance prize to a lucky person present at the meeting.

Members of our club were well represented at the South Texas State Fair Hobby Show last October. Young Harry Lea Kingston was awarded a blue ribbon for his worldwide collection. Mr. and Mrs. James R. Bradford, Jr., received a blue ribbon for their Puerto Rican collection. Jerome Wells and Mrs. J. H. Robins also received ribbons for their shell displays.

The Hammerhead Diving Club invited our members to their meeting to hear Dr. Thomas E. Pulley tell of his expedition with some of our local divers to the Flower Garden Reef located 25 miles off Galveston, Texas. The films that accompanied his talk were informative as well as very entertaining.

In April we were honored by a visit from Mr. and Mrs. J. W. Donovan of West Palm Beach, Florida. They spoke at our meeting and displayed their fabulous shells.

Our president and son attended the AMU meeting in St. Petersburg and returned to our club with renewed inspiration and plans received from the wonderful and gracious shell friends they met all along their trip through "the land of sunshine and seashells."

Officers for 1962-1963 are: President, Mrs. Harry Kingston; Vice-President, Mrs. J. B. Bishop, Jr.; Secretary-Treasurer, Mrs. George Wells; Historian, Harry Lea Kingston.

NORTH CAROLINA SHELL CLUB, Hugh J. Porter, Secretary-Treasurer: This past year's activities of the North Carolina Shell Club, as usual, have been quite varied. Due to scheduling difficulties, only three of the normal four meetings took place. The fall (1961) and summer (1962) meetings were field trip meetings and were held respectively at Wrightsville Beach and on the upper outer banks at Nags Head, N. C. The winter meeting was held at the North Carolina State Museum in Raleigh, N. C.

Meetings have included discussion of field trip finds, a report on fossil-shell hunting in Florida by Mr. and Mrs. Carl Withrow, a Tall Tale time, poetry readings, and exhibition of shell collections of members. Dr. John Ferguson in several taxonomic papers talked on the following superfamilies: Patellacea, Solemyacea, Nucleacea, Arcacea, Trochacea, and Mytiliacea. One program was devoted to the Muricidae found locally and those found worldwide by the Secretary and Dr. Ferguson. As usual, much time was spent in socializing and in the sale and trading of shells.

Officers for 1962 are: President, Mr. James E. Wadsworth; Vice-President, Mr. Carl C. Withrow; Secretary-Treasurer, Mr. Hugh J. Porter; Members of Executive Committee, Mr. K. L. Johnson and Dr. John Ferguson.

(Other AMU Member Clubs: Boston Malacological Club, Coastal Bend Shell Club, Greater Baltimore Shell Club, Northern California Malacozoological Club, Pacific Shell Club, Shell Club of the Ryukyu Islands, South Carolina Grand Strand Shell Club, South Florida Shell Club.)

LOUISE M. PERRY

1878-1962

Louise M. Perry, M.D., died August 8, 1962 at her home in Asheville, North Carolina following a long illness. A specialist of eye, ear and throat, she devoted many of her later years to the free clinic where she ministered to the eyes of mountain children.

For nearly twenty years she maintained a home on Sanibel Island, Florida where her interest in the shells of that area was kindled to the extent that in 1940 she wrote "Marine Shells of the Southwest Coast of Florida," which was revised in 1955 with co-author Jeanne S. Schwengel.

She was a past president (1943-1945) of the American Malacological Union.

FIRST EUROPEAN MALACOLOGICAL CONGRESS

LONDON—1962

(The following facts regarding the organization meeting of the *Unitas Malacologica Europaea* were supplied by Dr. Henry van der Schalie who conveyed the greetings of the American Malacological Union and who will speak at greater length of the new Union when the AMU shall convene in 1963. MCT)

From September 17 to September 21, 1962, about 140 interested persons met at the British Museum (Natural History) and at Queen Elizabeth College (University of London) in London, England for the purpose of forming a new scientific society in Europe to be devoted to the promotion of the science of malacology. As might be expected, residents of the United Kingdom made up the largest nationality group while the following countries also were represented: France, Belgium, Germany, Switzerland, Netherlands, Austria, Hungary, Romania, Denmark, Sweden, Norway, Italy, Portugal, Canada, United States, Greece, Southern Rhodesia, South Australia, New Zealand.

The following is a condensation of the five-day program:

Monday, September 17: Dinner at Queen Elizabeth College followed by a reception, also at Queen Elizabeth College.

Tuesday, September 18: Welcoming address by Dr. T. C. S. Morrison Scott, Director of the British Museum (Natural History); Discussion on the formation of a European Malacological Union; "Eastern Atlantic Mollusks," Dr. G. Thorson, Marine Biological Laboratory, Grønnehare, Elsinøre, Denmark and Dr. W. K. Ockelmann, Marine Biological Laboratory, Helsingør, Denmark; "Bivalves of Arctic Seas," Dr. Z. Filatova; "Fauna of the Zuider Zee," Mrs. W. S. S. van der Feen-van Bentham Jutting, Zoological Museum, Amsterdam, Netherlands.

Wednesday, September 19: "The Inter-relationships of Monotocardian Gastropods," Dr. V. Fretter, The University, Reading, Berkshire, England; "A case of negative contribution of functional morphology to classification," Dr. Bengt Hubendick, Naturhistoriska Museet, Göteborg, Sweden; "Some trends in the evolution of European Molluscan Faunas," Prof. T. Sorgenfrei, Danmarks Geologiske Undersøgelse, Hellerup, Denmark; "New researches on *Trichia hispida* Linn. and related forms," Dr. L. Forcart, Naturhistorisches Museum, Basel, Switzerland; "Terrestrial Faunistic Studies in Sweden," Dr. H. W. Waldén, Stockholm, Sweden.

Thursday, September 20: Field excursions to the Research Laboratory of the Ministry of Agriculture and to Box Hill in Surrey. In the evening an illustrated lecture, "Nautilus," by Dr. A. Bidder of Cambridge.

Friday, September 21: "Nerve and muscle physiology in Gastropods," Dr. Friedrich W. Schlote, Zoologisches Institut, Göttingen, Germany, Dr. N. Postma, Zoologisch Laboratorium, Nijmegen, Holland and Dr. R. H. Nisbet, Royal Veterinary College, London; "Recent population studies on *Cepaea nemoralis* L.," Dr. A. J. Cain, University Museum, Oxford; "Chromosomal evolution in Euthyneuran Snails," Dr. John B. Burch, University of Michigan, Ann Arbor, Michigan; Final discussion on the formation of European Malacological Union.

Thus the *Unitas Malacologica Europaea* came into being; the legal residence will be Switzerland, the next meeting will be held in about three years in Copenhagen, and the following are the current officers: President, H. Lemche (Denmark); Vice-President, Marc de Larambergue (France); Secretary, Adolph Zilch (Germany); Treasurer, Lothar Forcart (Switzerland); Auditors, Oliver E. Paget (Austria) and J. G. J. Kuiper (France).

* * *

More about the new European Malacological Union (*Unitas Malacologica Europaea*) as reported by Henry S. Gordon:

Americans present included R. Tucker Abbott and Robert Robertson of the Academy of Natural Sciences in Philadelphia; Henry van der Schalie, John B. Burch and Anne Gismann from the University of Michigan; Fritz Haas of Chicago's Natural History Museum; Alan Solem from the same institution, pausing in his worldwide travels; Hawaii's Alison Kay; R. Carriker of Woods Hole; Arthur Clarke, now doing his work in Ottawa; Dwight Taylor of the U. S. Geological Survey and Henry Gordon of the New York Shell Club.

The language barrier created almost unsurmountable difficulties for many. Luckily, several multilingual malacologists were present to save the day. Quite a scene to witness: a Dutchman acting as go-between for an American and an Italian, both of whom were struggling to converse with each other in a language with which they had only a halting acquaintance—French.

While it is perhaps unfair to single out individuals for special mention, some recognition should be given the dynamism of Gunnar Thorson of Denmark; the wise council of his compatriot, Prof. Lemche; the charm of Holland's Mrs. van Benthem Jutting (as well as her paper on how the closing off of the Zuider Zee affected a great part of that area's molluscan life); the contributions made in discussing formation of the Union by certain of the German contingent, including the eloquence of Richard Schlickum, an attorney from Cologne bitten by the molluscan "bug"; the smooth handling of the entire proceedings by chairman Crawford and all the British hosts; and the very presence of people from around the world, such as Dr. Dell of New Zealand and Mrs. Czabalay-Benkö of Hungary.

Unanimous was the election as President of Denmark's Henning Lemche, famed for his discovery of *Neopilina*. . . .

From *New York Shell Club Notes*, Number 85, October, 1962.

ACTIVE MEMBERS

Membership List Revised October 15, 1962

* Pacific Division member

- Abbott, Dr. R. Tucker, Dept. of Mollusks, Academy of Nat. Sci., Philadelphia 3, Pa.
Adams, Lawson, 2100 S. Bay St., Milwaukee 7, Wisc. (Amateur.)
Aguayo, Dr. Carlos G., College of Agriculture, Mayaguez, Puerto Rico.
Akers, Mrs. Frank, 334 Chilean Ave., Palm Beach, Fla.
*Albert, Mrs. Ernest, Post Eng. Rycom., Bldg. & Grds. Br., 8135 A.V. APO 331, San Francisco.
*Alexander, Mrs. Robt., 8542 Lemon Ave., La Mesa, Calif.
Alexander, Robert C., 423 Warwick Rd., Wynnewood, Pa.
Allen, Dr. J. Frances, 5702 Queen's Chapel Rd., W. Hyattsville, Md.
*Allen, Dr. S. F., 6234 W. 87th St., Los Angeles 45, Calif. (X-Rays of internal structure of shells.)
Allen, Miss Letha S., 107 W. 29th St., Baltimore 18, Md. (All shells.)
Allen, Lester E., 187 Argyle St., Yarmouth, Nova Scotia.
*Allison, Edwin C., 5262 Rincon St., San Diego 15, Calif. (Fossil, Recent and mega-micro marine invertebrates.)
Allwell, Mrs. Stephen S., 803 Evesham Ave., Baltimore 12, Md. (Rapididae; Magilidae; Coralliophiladae.)
American Assn. Advancement Science, 1515 Massachusetts Ave., Washington 5, D. C.
Anderson, Miss Edna L., 610 Parker St., Jacksonville 2, Florida.
Anderson, Miss Katherine M., Box 206, Chillicothe, Ohio. (*Pecten*, *Murex*.)
Arias, Sergio, M.D., Sociedad de Ciencias Naturales, Apartado 681, Caracas, Venezuela. (Land, f.w. mollusks of the neotropical region.)
Armstrong, Mrs. Eliot, 14 Meadow View Place, Buffalo 14, N. Y.
Arnold, Ben E., P.O. Box 7241, St. Petersburg, Fla. (Tropical and semi-tropical marines.)
Ashbery, Mrs. Wallace H., 12 E. Depew Ave., Buffalo 14, N. Y.
Ashworth, Ann S. and Jas. H., 9265 N.W. 32 Ct. Rd., Miami, Fla. (Live shells.)
Aslakson, Capt. and Mrs. Carl I., 5707 Wilson Lane, Bethesda 14, Md. (World marine shells.)
Athearn, Herbert D., R.F.D. No. 5, Cleveland, Tenn. (Fresh-water mollusks.)
Athearn, Mrs. Roy C., 5105 No. Main St., Fall River, Mass. (Land shells.)
Atherton, Margaret A., 103 Spring St., Scranton, Pa.
Atwater, Rev. David T., 50 Grace Court, Brooklyn 2, N. Y.
Awald, Clifford J., 162 Southwood Dr., Kenmore, N. Y.
- **Baily, Dr. and Mrs. Joshua L., Jr., 4435 Ampudia St., San Diego 3, Cal.
*Baker, E. P., 11619 Downey Ave., Downey, Calif. (Exch. Pacific Coast shells.)
Baker, Emmett B., 7 Riverview Ave., Kingston, Mass. (General interest.)
Baker, Dr. and Mrs. Horace B., Zoological Lab., Univ. of Penn., 38th St. and Woodland Ave., Philadelphia, Pa. Res. 11 Cheltenham Rd., Havertown, Pa.
Baker, John A., 1064 N.W. 28th St., Miami 37, Fla. (General interest.)
*Baker, Nelson W., 279 Sherwood Dr., Santa Barbara, Calif. (General interest.)
Ballentine, Mr. and Mrs. Corbin C., 126 E. Par Ave., Orlando, Fla. (Specimen shells and Florida fossil shells.)
Barbosa, Frederico Simoes, Caixa Postal 1626, Recife, Pernambuco, Brazil. (Freshwater shells.)
*Basch, Dr. Paul F., George Williams Hooper Foundation, Univ. of Calif. Medical Center, San Francisco 22, Calif. (Freshwater pulmonates.)

- Bayer, Frederick M., Div. of Marine Invert., U. S. Nat'l Museum, Washington 25, D. C.
- Beaumont, J. V., 904 Orange St., Apt. B., New Orleans 13, La.
- Beaven, Dr. and Mrs. J. Mahlon, 175 W. Ridgewood Ave., Ridgewood, New Jersey. (Amateurs; beautiful shells.)
- *Beck, Mrs. R. G., 4040 State St., Space 135, Santa Barbara, Calif.
- Becker, Mr. and Mrs. Albert F., 2157 Sunrise Dr., La Crosse, Wisc. (Mississippi River shells.)
- Becker, Miss Louise W., 2 Lexington Ave., Buffalo 22, N. Y.
- *Bedford, Chas. A., R.R. 1 Gower Point, British Columbia, Canada. (Marine life in general.)
- Bedell, Adele Koto, 2643 Laundale Dr., Beloit, Wis.
- Beetle, Mrs. Dorothy E., 609 Russell St., Laramie, Wyo. (World land, f.w. shells.)
- Behrens, Grace, 179 Ft. Washington Ave., New York 32, N. Y. (Abalone, starfish.)
- Bengston, Mrs. Geo., Rt. 4, Independence, Iowa. (Land, f.w. and fossils.)
- Bequaert, Dr. Joseph C., Biology Dept., Univ. of Houston, Houston, Texas.
- Berg, Dr. Clifford O., Dept. Entomology, Cornell Univ., Ithaca, N. Y. (Flies which kill and eat snails.)
- Berg, Mrs. Frederick C., Georgetown, Md. (Shells of the Fla. Keys.)
- *Bergeron, Eugene, P.O. Box 1236, Balboa, Canal Zone. (Biol. Survey Panamic Range mollusks.)
- Berrier, Theo., 2540 Massachusetts Ave., N.W., Washington, D. C. (All shells.) Range—fauna Mollusca.)
- Berry, Dr. and Mrs. Elmer G., National Institutes of Health, Bethesda 14, Md.
- *Berry, Dr. S. Stillman, 1145 W. Highland Ave., Redlands, Cal.
- *Bickford, Glen, 2350 W. 250th St., No. 39, Lomita, Calif. (W. American marine shells; world Haliotidae.)
- Bijur, Jerome M., 65 Lancaster Ave., Paoli, Penn. (Florida shells.)
- Bippus, Alvin C., 2743 Sagamore Rd., Toledo 6, Ohio. (Marine univalves.)
- Bixby, Mrs. H. M., Look See, Captiva, Florida. Summer: Bolton Landing, New York.
- Blaine, Mr. and Mrs. Alger P., 74 Palmer Ave., Springfield, Mass. Winter: 1805 20th Ave., St. Petersburg, Fla.
- *Bleitz, Mrs. Mary Lou, 3228 California Ave., S.W., Seattle 16, Wash. (Shells of Puget Sound.)
- Blinn, Walter C., Dept. Nat. Sci., Mich. State Univ., E. Lansing, Mich. (Ecology and behavior of land snails.)
- Bloom, Robt. J., 201 Brentwood Dr., Syracuse 9, N. Y.
- Boca Grande Hotel, Boca Grande, Florida.
- Bodden, Mrs. John M., Cleveland Museum of Natural History, Cleveland, Ohio.
- Boston Malacological Club, c/o Barbara Crowley, 109 Lexington St., Watertown, Mass.
- Bowin, Hugh, 11600 Gulf Blvd., Treasure Island 6, Fla.
- Bradfield, Mrs. Jesse, Mt. Alto, Rome, Ga. (General collecting.)
- Brakefield, Gertrude E., 3830 7th St., N., St. Petersburg, Fla. Summer: Water Wonderland, Indian River, Mich.
- Bradley, J. Chester, 604 Highland Rd., Ithaca, N. Y.
- Bradley, John C., 469 Farmington Ave., Waterbury 10, Conn. (Travel and collect.)
- Branson, Branley A., Dept. of Biology, Kansas State College of Pittsburg, Pittsburg, Kansas. (S. W. gastropods & fishes.)
- Brimmer, Allen, 9805 Parkwood Dr., Bethesda 14, Md. (*Harpa*; Cephalopoda, *Spondylus*; *Dentalium*.)
- Broadus, Jas. M., III, 4464 Old Shell Rd., Mobile, Ala. (Gulf of Mexico species.)
- Brogan, Matthew C., 4122 Bergenline Ave., Union City, N. J. (*Littorina*—regional study.)
- Bronner, Dr. and Mrs. Carl E. Cahn, 5417 S. Blackstone Ave., Chicago 15, Ill.
- Brooks, Mr. and Mrs. John C., 711 S. Indian River Dr., Ft. Pierce, Fla. (Florida marine mollusks.)

- Broward Shell Club, 3313 Southeast 2nd St., Pompano Beach, Fla.
- *Brown, Dorothy, 1451 N. Ogden Dr., Los Angeles 46, Calif. (Pectenidae.)
- Brown, Mr. and Mrs. N. C. L., 21 Browns Ave., Scottsville, N. Y.
- Brown, Mrs. Ward, 1420 N. Lakeside Dr., Lake Worth, Florida.
- Broyles, Mrs. Ralph E., 5701 Fairfield Ave., Ft. Wayne 6, Ind.
- Brugman, Chas., Box 468, Lahaina, Hawaii. (Shells and black coral of Hawaii.)
- *Brunson, Dr. Royal Bruce, Montana State Univ., Missoula, Mont.
- *Bryan, Edwin H., Jr., Bishop Museum, Honolulu 17, Hawaii. (Pacific biogeography and bibliography.)
- Buerk, Minerva S., M.D., Bryn Mawr Med. Bldg., Bryn Mawr, Penn.
- Burch, Dr. John Bayard, Museum of Zool., U. of Mich., Ann Arbor, Mich. (Land and f.w. mollusks.)
- **Burch, Mr. and Mrs. John Q., 4206 Halldale Ave., Los Angeles 62, Calif.
- Burchell, Herbert R., 1300 S.E. 1st Ave., Deerfield Beach, Fla.
- Burgers, Dr. and Mrs. J. M., 4622 Knox Rd., Apt. 7, College Park, Md. (Amateurs.)
- *Burton, Helen A., 391 Adams St., Oakland 10, Calif.
- Cahoon, Ruth Mary, 1108 Fairfield St., Scranton, Penn.
- Cardeza, Carlos M., 3829 Gertin St., Houston 4, Texas. (Making collection properly.)
- Carley, T. S., 407 Kingston, Deerfield, Ill. (General interest.)
- Carpenter, Maj. and Mrs. Walter N., 7115 Healy Dr., Springfield 14, Va. (Exchange, buy, sell.)
- Carriker, Dr. Melbourne R., Biol. Lab., U.S. Bureau Comm. Fisheries, Oxford, Md. (Morphology of drilling mechanism in gastropods; ecology.)
- Cartwright, Mrs. Jas. B., 4533 Park Ave., Memphis 17, Tenn. (Atlantic and Gulf Coast shells.)
- **Cate, Mr. and Mrs. Crawford N., 12719 San Vicente Ave., Los Angeles 49, Calif. (*Cypraea*; Hawaiian Mollusca.)
- **Chace, Mr. and Mrs. Emery P., 3446 Van Dyke Ave., San Diego 5, Calif.
- Chamberlin, Dr. Lockwood J., 509 Franklin St., Alexandria, Va.
- Champion, Dr. Merrill E., Museum of Comp. Zool., Cambridge 38, Mass.
- Chandler, Mrs. Doris M., P.O. Box 621, Chatham, Mass. Winter: P.O. Box 2344, Ft. Myers Beach, Fla.
- *Cheever, Dr. Austin W., 1330 St. Louis Drive, Honolulu 16, Hawaii.
- *Christensen, Carl, 1311 Wawe Pl., Honolulu 18, Hawaii. (*Conus*, *Cypraea*, *Voluta*.)
- Clarke, Dr. Arthur H., Jr., Dept. of Mollusks, National Museum of Canada, Ottawa, Canada.
- Clarke, Dr. Rosemary, Music Dept., Univ. of Dubuque, Dubuque, Iowa. (*Liguus*.)
- Clements, Mr. and Mrs. Curtis L., Betty's Hawaiian Village, Sanibel Is., Fla.
- Clench, Dr. William J., Museum of Comp. Zool., Cambridge 38, Mass. (Collect, exchange, buy.)
- Closs, Dr. Darcy, Escola de Geologia (Universidade do Rio Grande do Sul) Avenida Paulo Gama sn. Porto Alegre (RGS), Brazil. (Cephalopods, Pelecypods.)
- *Coan, Eugene, 891 San Jude Ave., Palo Alto, Calif.
- Coastal Bend Shell Club, c/o Corpus Christi Museum, 1202 N. Water St., Corpus Christi, Fla.
- *Coats, Miss Ruth E., 3846 Skyline Rd., Carlsbad, Calif.
- Cole, Mrs. Beatrice M., P.O. Box 1003, Naples, Fla. (Worldwide; exch.)
- Coleman, Mrs. Nellie, 5308 Third Ave. So., St. Petersburg, Fla.
- Coley, Mrs. Gene, Carolina Apts., 840 Carolina Ave., Winston-Salem, N. C.
- Compitello, Mrs. Juliette, 399 St. John's Place, Brooklyn 38, N. Y.
- *Conchological Club of So. Calif., Los Angeles County Museum, Los Angeles, Calif.
- Conchological Section, Buffalo Society Nat. Sciences, c/o Mrs. Leslie Potter, 6350 Main St., Williamsville 21, N. Y.
- Condé, Vincente, Redpath Museum, McGill Univ., Montreal, Canada.

Conkling, Joseph E., Box 264, Edgartown, Mass. Winter, 628 4th Ave., S. St. Petersburg, Fla. (Collect, buy, exchange.)

Connecticut Shell Club, Peabody Museum, New Haven, Conn.

Connecticut Valley Shell Club, Springfield Museum Nat. History, 236 State St., Springfield, Mass.

Coomans, Dr. H. E., Am. Museum Nat. Hist., Central Park W. at 79th St., New York 24, N. Y.

*Coomler, Bob, 6047 Comey Ave., Los Angeles 34, Calif.

Corbett, Wm. Phelps, 2939 Nelson St., Ft. Myers, Fla. (Exch. rare *Cypraea*, *Olivia*, *Murex*.)

Cornell University Library, Ithaca, N. Y.

Cowles, Edward F., Jr., 12 Hillcrest Ave., New Rochelle, N. Y. (Tropical marine shells; photography.)

Craig, Mrs. Anne Gwynne, Camaron Trailer Park, APDO Postal 233, Mazatlán, Mexico. (Shells of Panamic Province.)

Craig, Mrs. Robt. E., II, 209 Audubon St., New Orleans 18, La.

Craine, Ruth A., 82 So. Broad St., Norwich, N. Y.

*Cramer, Frances L., Life Science Dept., E. Los Angeles College, 5357 Brooklyn Ave., Los Angeles 22, Calif. (Ecology; conservation.)

Crant, Harold, The Shell Factory, P.O. Box 1231, Ft. Myers, Fla.

Crum, Mrs. Dan, 930 N.E. 23rd St., Crest Haven, Pompano Beach, Florida. (*Conus*; *Voluta*.)

Cull, Mrs. R. R., 7927 Chippewa Rd., Brecksville, Ohio.

Cummings, Raymond W., 121 Rugby Rd., Syracuse, N. Y.

Daley, Timothy T., Social Service Dept., Box 310, Nova Scotia Hospital, Dartmouth, N. S. (Atlantic coast mollusks.)

D'Amico, Joseph S., 119 Persimmon Lane, Lake Jackson, Texas.

D'Attilio, Mr. and Mrs. Anthony, 44 Lynwood Dr., Valley Stream, L. I., N. Y.

Danforth, Miss Louise L., Box 415, Vineyard Haven, Mass. (New Eng. shells.)

Darling, F. Murray, 3313 Achusnet Ave., New Bedford, Mass. (Marine life.)

Davis, Dr. George, University Museums, Ann Arbor, Mich.

Davis, Harry T., Director, North Car. State Museum, Raleigh, N. C.

Dawley, Dr. Charlotte, The Women's College, University of N. C., Greensboro, N. C.

Dawson, Mr. and Mrs. Harris P., Jr., 5226 Farrington Rd., Washington 16, D. C.

Dazo, Boniface & Leticia, 1433 University Terrace, Apt. 726, Ann Arbor, Mich. (Land, f.w. mollusks of U. S. & Philippines.)

Deatrick, Paul A., P.O. Box 35-366, Miami, Fla. (*Strombus*, *Busycon*.)

Decker, Mrs. Madaline G., 6299 34th Ave., N., St. Petersburg 10, Fla.

DeLuca, Miss Gladys and Mrs. John A., 16 Oakland Ave., Wollaston 70, Mass.

Derr, Mr. and Mrs. John S., Jr., Dearbought, Rt. 1, Frederick, Md.

Desmond, Hon. Thos., 94 Broadway, Newburgh, N. Y.

DeStefano, Dr. and Mrs. Fredrick, 55 W. Elizabeth, Brownsville, Texas. (Gulf of Mexico shells.)

Deupree, Wm. W., 276 Buena Vista, Memphis 12, Tenn.

*De Vore, Mrs. Henrietta, Star Route, New Cuyama, Calif.

*DeWitt, Mr. and Mrs. Harlon L., Jr., 1507 W. 104th St., Los Angeles 47, Calif. (Mexican and Pacific Coast shells.)

DeWitt, Robt. M., Biol. Dept., Univ. of Fla., Gainesville, Fla.

Dexter, Dr. Ralph W., Dept. of Biology, Kent State Univ., P. O. Box 507, Kent, Ohio.

Diemond, John D. and Alice W., 17471 Gulf Blvd., St. Petersburg 8, Fla. (World shells.)

Dietrich, Mr. and Mrs. Louis E., 301 Veri Ave., Pittsburgh 20, Pa. (Mollusks of the West Indies.)

Djordjevic, Branimir, 335 Samford Ave., Auburn, Ala.

Dodd, William E., M.D., Ocean St. & Bay Ave., Beach Haven, N. J.

Dodge, Henry, 6 Rochambeau Rd., Scarsdale, N. Y.

- Donahue, Enid P., P.O. Box 35, Sanibel, Fla.
 Donnelly, John F. and Katherine, 131 E. 26th St., Holland, Mich.
 Donovan, James W., 3718 Calvin Ave., West Palm Beach, Fla.
 *Drahorad, Mrs. Karl, P.O. Box 73, Nehako P.O., Kitimat, B. C., Canada. (No. Pacific coast.)
 *Drake, Robt. J., Dept. of Zool., Univ. of British Columbia, Vancouver 8, B. C., Canada
 Duarte, Eliseo, Casilla Correo 1401, Central, Montevideo, Uruguay. (Exch. shells and information.)
 Dundee, Dr. Dolores S., Div. of Science, Dept. Biology, LSU in New Orleans, New Orleans 22, La. (Land mollusks, f.w. mussels.)
 Dunn, V. Roger, 5021 18th Ave., S., Gulfport, Fla. (*Conus*.)
 Dvorak, Stanley J., 3856 W. 26th St., Chicago 23, Ill. (Muricidae.)
 *Eaton, Miss Ruth E., 3333 Orange St., Riverside, Cal.
 Echardt, Mary Jean, 35 Prospect Park West, Brooklyn 15, N. Y.
 *Edmiston, Mrs. J. R., 425 Battery St., San Francisco 11, Calif.
 Eggleston, Dr. Harla Ray, Chairman, Dept. of Biol., Marietta College, Marietta, Ohio.
 Emerson, Dr. Wm. K., Am. Museum of Nat. Hist., Central Park W. at 79th St., New York 24, N. Y.
 Emery, Adele K., Box 1265, South Miami, Florida. (Fla. E. coast marines.)
 Enders, Mr. and Mrs. Ernest M., 3 Ellen Dr., Farmington, Conn.
 Endres, Theo. F., 633 Pleasant St., Algonac, Mich. (Amateur.)
 Erickson, Carl W., 4 Windsor Ave., Auburn, Mass.
 Eubanks, Mrs. Edwin W., 5108 Spring Glen Rd., Jacksonville 7, Fla. (Florida marine shells.)
 *Eyerdam, Walter J., 7531 19th Ave. N.E., Seattle 5, Wash.
 Faulkinbury, R. P., 106 Pensacola Ave., Fairhope, Ala. (Small shells of N.W. Florida and Alabama.)
 Feinberg, Harold, 2334 Tiebout Ave., Bronx 58, N. Y. (Land, freshwater.)
 *Field, Clyde L., 2534 "K" Ave., National City, Calif.
 Finlay, C. John, 204 Milltown Rd., Cooper Farm, Wilmington 8, Del. (W. Indian marine shells.)
 *Fisler, John K., 3465 Charter Oak Dr., Carlsbad, Calif. (General.)
 *Fitch, John E., Calif. State Fish. Lab., Terminal Island, San Pedro, Cal.
 Fitzgerald, Mrs. Arthur C., 11 Joy St., Boston 14, Mass. (Marine borers.)
 Fleer, Mrs. Paul C., 701 Carriage Hill Dr., Glenview, Ill.
 **Fletcher, Mr. and Mrs. Howard L., 1008 La Hermosa Dr., Redlands, Calif.
 Flipse, Robt. C., M.D., and Mrs. Flipse, 1091 N.E. 88th St., Miami 38, Fla.
 Flowers, Mrs. Edmay V., 2815 S.W. 8th Drive, Gainesville, Fla. (Marine.)
 Fobes, Cm/Sgt. Edwin L., 12320 S. 27th Ave., Omaha 47, Neb. (*Cypraea*.)
 Foeehrenbach, Jack, 91 Elm St., Islip, L. I., N. Y. (Lamellibranchia.)
 Foley, H. Theo., 921 Ontario St., P.O. Box 821, Shreveport, La.
 Folsom, Mrs. D. L., 1060 Franklin St., Melrose 76, Mass.
 Foote, Benj. A., Dept. Biology, Kent State Univ., Kent, Ohio. (Fly larvae that kills snails.)
 Ford, Mr. and Mrs. Flynn, 1533 Topping Rd., St. Louis 31, Mo.
 Forrest, Mrs. Wilbur, The Birches, New Hope, Pa.
 Forrester, Donald J., Dept. Zool., Montana State Univ., Missoula, Mont. (Terrestrial land mollusks, esp. mountain sp.)
 *Forthune, Miss Effie, Apt. 203, 507 Harvard, N., Seattle, Wash.
 Foster, Mr. and Mrs. Bernard J., 1704 Golf View Dr., Clearwater, Fla.
 Foster, Mrs. Fred H., Oxford, Ind. (Shells in general.)
 Foster, Richard W., Museum Comp. Zool., Cambridge 38, Mass.
 Fowler, Miss Verna A., 616 S. Santa Fe St., Salina, Kansas.

- Frampton, Mr. and Mrs. Henry G., Box 1052, Miami 6, Fla.
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- *Roworth, Edwin C., 1301 Windsor Dr., Cardiff-by-the-Sea, Calif. (Worldwide shells and sea life.)
- Roy, Edward C., Jr., Dept. Paleontology, O.S.U., 125 So. Oval Dr., Columbus 10, Ohio. (Invert. paleontology, non-marine mollusks.)

- Russel, Geo. H., 20505 Brooklawn Dr., Dearborn, Mich. (Fla. and West Indies brachio-
pods.)
- Russell, Dr. Henry D., Springdale Ave., Dover, Mass.
- Russell, Dr. Loris S., Dept. of Resources and Development, Nat. Museums of Can.,
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- St. Petersburg Shell Club, c/o Dorothy Hanssler, 64-31 17th Place, N., St. Petersburg,
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marine mollusks.)
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- Smith, Wm. A., 112 Lonnie Lee Lane, Hudson Beach Estates, Port Richey, Fla. (Fla.
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Louise M. Perry
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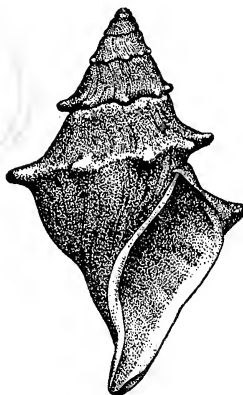
THE AMERICAN MALACOLOGICAL UNION



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Pacific Division



ANNUAL REPORTS
for 1963



A.M.U., Twenty-ninth Annual Meeting
A.M.U., P.D., Sixteenth Annual Meeting

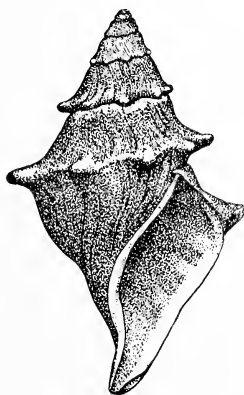
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ANNUAL REPORTS
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A.M.U., Twenty-ninth Annual Meeting
A.M.U., P.D., Sixteenth Annual Meeting

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Bulletin number 30, December 1, 1963. Issued annually by the American Malacological Union. Editorial Board: Morris K. Jacobson, Publications Editor, Margaret C. Teskey, Secretary. Office of Publication: Route 2, Box 318, Marinette, Wisconsin.

THE AMERICAN MALACOLOGICAL UNION

TWENTY-NINTH ANNUAL MEETING

Buffalo, New York

June 18-21, 1963

Although the American Malacological Union began as an idea in Maine and was organized in Philadelphia, it may be said to have grown up in Buffalo. For the first nineteen years all of the voluminous correspondence necessary in carrying on the affairs of a young and growing organization emanated from the desk of secretary Imogene Robertson who was at the same time curator of mollusks at the Buffalo Museum of Science. The first twenty-six annual bulletins were printed on the Museum press. The Museum played host on occasion of the 1935 and 1951 annual meetings. No wonder, then, that when in 1963 members of the AMU converged on Buffalo it was in the spirit of homecoming.

As always, the latchstring was out. From earliest planning far in advance of meeting date until the last guest had been bade farewell, Museum Director Fred T. Hall and his busy staff were at work, overseeing the endless details which ensure the smooth conduct of a function such as this. Like nine-tenths of an iceberg the hard work is largely out of sight.

Headquarters hotel was the Statler-Hilton in the heart of downtown Buffalo. A chartered bus transported guests the several miles between hotel and Museum each day, to dinner and a special session at the University of Buffalo and on a tour of Niagara Falls the final day.

Registration began at the hotel at nine o'clock on Tuesday morning, the Executive Council convened at 11:00 at the Museum. The session was halted briefly at noon while council members were served a delicious luncheon by Virginia Cummings, Norma Emigh and Ruth Sparrow—old-timers of the Museum staff and veterans all of at least one previous AMU meeting in Buffalo.

This unexpected and delightful kindness was typical of the hospitality tendered throughout the four-day meeting by the Museum and its affiliated Conchological Section. This latter group, the oldest shell club in the United States, served with the Museum as co-host. President Eugene Musial and his fellow members were always on hand, taking care that their guests might want for nothing that might increase their comfort and enjoyment of the meeting.

At 1:30 in the spacious Museum auditorium Dr. Albert R. Mead wielded the presidential gavel to signal the opening of the twenty-ninth annual meeting. He introduced Mr. Fred T. Hall, already well known to many of his audience.

In his capacity of Director of the Buffalo Museum of Science Mr. Hall voiced a warm welcome, urged his guests to feel at home in the Museum, to disregard any "no admittance" signs and to ask the staff for any assistance, information or guidance.

He then presented Mr. George F. Goodyear, President of the Buffalo Society of Natural Sciences.

Mr. Goodyear echoed the welcome of Mr. Hall, then reminded his audience that the history of the American Malacological Union is tied closely to that of the Buffalo Museum of Science. He spoke fondly of the late Imogene Robertson and of her part in furthering the cause of both institutions. "We are proud to have witnessed the beginning and the progress of your Union; proud too that our own beginning goes back a bit further. The Buffalo Society of Natural Sciences came into being in 1861!"

In response, President Mead observed that the present meeting was, in a sense, dedicated to Mrs. Robertson and to Dr. Henry Pilsbry. "Both of them saw great things ahead. The steady growth of the AMU pleased them both and neither would have agreed with those who occasionally voice the opinion that the organization is becoming too large. The balance of amateur and expert was especially satisfying to Dr. Pilsbry who felt that the term 'Union' meant just that."

The attractive programs, said he, were wholly the work of Mr. Hall and his staff. On the flyleaf was reproduced a photograph of Imogene Robertson while the cover was ornamented by a drawing (by Mr. Hall) of *Lambis violacea* Swainson, a rare shell from the Robertson collection now owned by the Museum.

President Mead pointed out that the program presented a broad spectrum with something for everybody. Built-in breaks had been planned to forestall physical and mental fatigue, and since there was an unusually large number of papers to be presented he requested that each speaker stay within the time allotted.

He then introduced the first paper:

MALACOLOGY IN 1963. William J. Clench, Museum of Comparative Zoology, Harvard University.

(Due to the crowded schedule little or no discussion followed the papers.)

(Abstract)

A brief review was given regarding the development of malacology during the past 25 years. A generation ago, most of the world was available to scientific exploration, and today nearly half of the world is closed to such exploration, mainly because of political unrest and the "cold war."

Two of the most outstanding discoveries of the past 25 years were outlined, that of *Neopilina* and *Berthelinia*, and also the notable discovery by Mapes and Krull of Cornell University of the double invertebrate vectors needed in the development of the lancet fluke of sheep.

A short account was given of the spread of *Corbicula fluminea* (Müll.), the asiatic clam, throughout portions of North America.

BRIEF HISTORY OF SHELL INTEREST AND AMERICAN SHELL CLUBS. Katherine Van Winkle Palmer, Paleontological Research Institution, Ithaca, New York.

(Abstract)

The history of interest in shells is briefly traced from early man of Cro-Magnon time, 10,000-15,000 years ago, through the periods of mythology, ancient rites, shell trumpets, dye and pearl industry, religion, art, historic shell collection, the 17th century elaborately depicted folios, the 18th century

malacological societies, the 19th century natural history museums in the United States, early American conchologists, and the development of shell clubs from 1897 to the present. About thirty organized shell clubs in the U.S.A. affiliate with the American Malacological Union. There are probably others in process of formation. The clubs have a membership of from 12 to 250. Many publish a newsletter or a scientific publication which may have a subscription list of over 480. The clubs extend from Massachusetts along the Atlantic Coast, Florida, St. Louis, the Northwest, several in California, and the Pacific. The following is a list of the existing groups with date of organization: Conchological Section Buffalo Society of Natural Sciences, 1897; Conchological Club of Southern California, 1902; Boston Malacological Club, 1910; St. Petersburg Shell Club, 1934; Long Beach Shell Club, 1938; Hawaiian Malacological Society, 1941; Pacific Shell Club (California), 1943; Clench Conchological Club (Worcester, Mass., suspended), 1944; New York Shell Club, 1949; Sacramento Valley Conchological Society, 1951; Northern California Malaco zoological Club, 1952; Greater St. Louis Shell Club, 1954; San Antonio Shell Club, 1955; Philadelphia Shell Club, 1955; Greater Baltimore Shell Club, 1956; North Carolina Shell Club, 1957; Coastal Bend Shell Club, 1958; Palm Beach County Shell Club, 1958; Naples Shell Club, 1959; Connecticut Valley Shell Club, 1959; National Capitol Shell Club, 1960; Shell Club of the Ryukyu Islands, 1960; Jacksonville Shell Club, 1960; Northwest Shell Club, 1960; South Carolina Grand Strand Shell Club, 1961; Gulf Coast Shell Club, 1961; South Florida Shell Club, 1961; Sanibel-Captiva Shell Club, 1961; Broward Shell Club, 1962; Santa Barbara Shell Club and a Texas Club, 1962; Garden City, N.J., 1963; Kauai, ?; Connecticut Shell Club, ?.

COLLECTING ON COCOS-KEELING, INDIAN OCEAN. Virginia Orr,
Academy of Natural Sciences, Philadelphia.

(Abstract)

From January until March, 1963, Mrs. R. E. M. Ostheimer and I collected at Cocos-Keeling for the U.S. Program in Biology, International Indian Ocean Expedition. As our collection is still in transit to Philadelphia, the following comments are based on field observations and literature.

Cocos-Keeling is a small atoll in the eastern Indian Ocean lying about 900 miles west of Java and 1,300 miles northwest of Australia. The nearest land is Christmas Island, 500 miles away. Cocos is surrounded by the 13,000 foot deep India-Australia Basin. It is washed by the South Equatorial Current which flows north along the coast of Western Australia and then west. Bits of pumice and volcanic bombs from the volcanoes of Java and Sumatra are washed up on the beaches. This is probably due to shifts in the prevailing SE Trade Winds which occasionally blow from the east and even north of east.

Because the atoll is small and has never been connected with a large land mass, all of its littoral molluscan fauna has arisen from stock which has crossed at least 500 and probably 900 or more miles of open sea. Most of the mollusks are widespread Indo-West Pacific species, a few are limited to the Indian Ocean but several, including *Strombus luhuanus* Linné and *Nassa sarta* Bruguière, are distinctly Pacific, not Indian Ocean in distribution.

This Pacific Ocean affinity is found in corals and fishes as well as mollusks.

Habitats for Cocos littoral mollusks are limited to coral reefs and coral sand lagoon. The ring of low islands (none more than twenty feet above sea level) do not supply sufficient nitrogenous wastes for the mud-loving species and there are no mangrove swamps or hard rock ledges. This is probably more of a limiting factor on the number of species than the open ocean hazards faced by immigrating stocks.

Abbott (1950) listed 163 species of mollusks from Cocos. This list was based on material collected incidentally in the course of other work by Gibson-Hill. It included only the larger more conspicuous species. We believe this number will be at least doubled when our material has been sorted, for although some groups of mollusks are scarce or missing, we found a surprising number of species as well as individuals.

Our trip was as enjoyable as it was successful because almost everyone we met on the atoll helped us in one way or another. But we are particularly indebted to Mr. and Mrs. John Clunies-Ross and Mr. and Mrs. Gerald Clunies-Ross for all their kindnesses.

SOME UNEXPLORED COLLECTING LOCALITIES IN SAN SALVADOR. Morris Karl Jacobson, New York Shell Club.

(Abstract)

The inland molluscan fauna of El Salvador has been poorly studied and is known only very sketchily. Martens in his monumental study in *Biologia Centrali Americana* mentions only 11 Salvadorean localities. In addition there are two papers dealing with this fauna, one by A. Zilch on the brackish-water forms, and a recent one by Fred Thompson in which several new species are named.

On a hasty Christmas week trip, the speaker was able to visit 17 localities of which 7 proved absolutely barren, and 10 more or less productive. All 17 localities were inland except for 2 marine and one brackish water. In all, limiting ourselves only to inland mollusks, 11 species were collected, of which 7 are fresh water and 4 land. The most productive places were the Rio Chilama near La Libertad, where a nice series of *Neritina latissima* Broderip was taken; Lake Coatepeque which yielded three species (*Cyraululus* sp., *Amnicola* sp., *Physa* sp.), all queerly dwarfed probably by the sulphur content of the water; and Arroyo Agua Dulce near Panchimalco where a large series of *Pachychilus largillierii* (Philippi) was found. The most interesting find was a large colony of *Aperostoma dysoni* (Pfeiffer) on the shore of Lake Coatepeque. This is the first record of this widely distributed species in El Salvador. Lake Ilopango, the largest and most beautiful lake in the country, seems to be utterly barren of molluscan life. The same is true of many other lakes.

With this paper the afternoon session of opening day was concluded. The now familiar bus transferred everyone back downtown, and following dinner the scheduled evening session was called to order in the Hotel Statler's Georgian Room.

SHELL ORCHESTRA. Gertrude Musial, North Tonawanda, New York.

This was a recording of two hymns played on triton shells by students

in a New Guinea mission school. Tuned one note to a shell, one shell to a boy, the somber music was somewhat akin to that of a giant pipe organ. Since Mrs. Musial was unable to be present the preliminary explanation was made by Mr. Eugene Musial. Many who had attended the 1951 meeting recalled having been entertained by this unique presentation.

SOME LIVING MOLLUSKS. Dorothy Raeihle, Elmhurst, New York.

The superb photography of Mr. George Raeihle was again in evidence in this showing of color slides, life studies of some 30 of our common western Atlantic mollusks. The four species of *Natica* were pictured, an interesting comparison. In a series of shots *Lunatia triseriata* was shown carrying a *Mytilus edulis* around, then under the sand; an unidentified nudibranch performed a graceful "ballet"; *Aplysia dactylomela* emitted a purple stain when disturbed and *Cyphoma mcgintyi* was pictured on the purple sea whip on which it was found. These unfamiliar architects of familiar shells held spellbound a most appreciative audience.

PACIFIC SNAIL TRAIL. G. Alan Solem, Chicago Natural History Museum.

This was a pictorial account of the recent trip made by Dr. and Mrs. Solem as they collected and studied in Hawaii, Tahiti, Fiji, New Caledonia and New Zealand. Highlights of the series of beautiful slides included pictures of land mollusks and of A. W. B. Powell demonstrating that nikau palm fronds make excellent toboggans.

EXPEDITION TO THE BAY OF BENGAL. R. Tucker Abbott, Academy of Natural Sciences, Philadelphia.

In direct contrast to the preceding series Dr. Abbott transported his audience, via color slides, to tropical seas where he had recently concluded dredging operations aboard the 270' research vessel *Anton Bruun*. In addition to securing valuable shells for his museum he collected a not-so-pleasant memento of his trip—a badly broken arm suffered in a jeep accident in Cambodia.

* * *

It was past ten when the evening session was over; at 8:30 the following morning the bus was boarded for transfer to the Museum and an unusually full day.

PROBLEMS OF SPECIES ANALOGUES IN WORLD LITTORINIDAE.

Joseph Rosewater, U.S. National Museum, Washington, D.C.

(Abstract)

The neutral term, analogue, is used in malacology to designate species which resemble each other, and may be related, but which occur in different geographic areas (see Webster's Unabridged Dictionary, 1960, ed. 2, usage 3, c). A comparison of Littorinidae from the major world marine faunal regions reveals the presence in two or more areas of species which may be considered analogues.

Similarities vary from slight resemblances to forms which are impossible to separate except geographically. Northern species which are real or apparent analogues are: (1) *Littorina littorea* from both sides of the Atlantic and *L. squalida* from both sides of the Pacific; (2) *L. saxatilis* and *L. sitkana* in the same areas, respectively. South Temperate and Tropical analogues are

more numerous; (3) *L. varia*, Eastern Pacific, and *L. irrorata*, Western Atlantic; (4) *L. undulata*, Indo-Pacific, and *L. nebulosa*, Western Atlantic; (5) *L. melanacme*, South Australia, and *L. planaxis*, Eastern Pacific; (6) *L. glabrata* and *L. mauritiana*, both western Indian Ocean, form a group which seems close to *L. ziczac*, Western Atlantic; (7) *L. pintado*, Indo-Pacific, *L. schmitti*, Clipperton Island, and *L. tessellata*, Western Atlantic; (8) *L. scabra*, Indo-Pacific, *L. fasciata*, Eastern Pacific, and *L. angulifera*, both sides of the Atlantic. The last group probably consists of three geographic races, or subspecies, rather than analogues, since, so far as is known, their reproduction and ecology are similar, and their morphology, except for slight regional differences, shows striking resemblance.

Origins of marine analogues probably date from geologic periods when land configurations and ocean currents were different from those of today. Later, widely distributed species may have been divided into groups by the establishment of land barriers and changes in water temperatures or currents. The resulting reproductive isolation would play a significant role in perpetuating differences which might arise between the separated groups. Present widely distributed species, such as *L. scabra*, and its subspecies, may take advantage of mechanical means of dispersal; the species is usually found on mangroves and wharf pilings which can be uprooted by storms and float great distances. The latter may account for the occurrence of *L. scabra* and its subspecies throughout the tropical regions of the world, but it is doubtful that dispersal from one region to another is taking place continually. Probably it has occurred several times in the past and transplanted individuals may have populated new regions. Also, it is possible that the species is quite stable genetically and from an earlier period has maintained its worldwide range having evolved only slight regional distinctions.

The real problems arising from recognition of species analogues are associated with their classification. It is necessary to determine their degree of relatedness to know whether or not the analogues are the same species, subspecies, or are entirely separate species whose resemblances result from character convergence. To decide this, morphological, biological, and ecological data are needed, but in most cases these are lacking and only slowly are being accumulated. Until such time as these are available, the systematist will have to rely in classifying analogues on his educated intuition together with what scientific information is available.

THE GENUS *AGARONIA* (OLIVIDAE). John Q. Burch, Los Angeles, California.

(Abstract)

The genus *Agaronia* J. E. Gray 1839 has priority over *Olivancillaria* d'Orbigny 1840. If either is to be made a subgenus of the other the genus should be *Agaronia*.

The species *urceus* Röding 1798 is unquestionably prior to the Lamarckian *brasiliانا* 1811. The same figures were cited by Deshayes in the second edition of Lamarck's "Histoire" that are given as the basis of the Röding name.

The species *lutraria* Röding 1798 places the species *acuminata* Lamarck, 1811 in synonymy.

The radulae of the following species were studied: *testacea* Lamarck, 1811; *urceus* and *lutraria* Röding 1798; *auricularia* Lamarck 1811; *contortuplicata*

Reeve 1850. All show small denticles on the sides of the rachidian teeth that are not present in the genus *Oliva*.

The question asked was whether or not this is sufficient to unite them all under the genus *Agaronia*.

NOTES ON AMERICAN SIPHONARIA.¹ J. P. E. Morrison, U.S. National Museum, Washington, D.C.

(Abstract)

Thorson in 1940 reported that two species of *Siphonaria* from the Persian Gulf differed in life history in relation to their intertidal habitats. The same parallels of zonation and development are now known for Eastern American species. *Siphonaria pectinata*, of the lower intertidal zone, lays soft jelly egg masses out of which pelagic larvae hatch. Both *S. picta* of Brazil and *S. alternata* of Florida, living in the upper tidal or splash zone, lay firmer jelly egg masses that do not dry out even in the direct sun. The snails of these species hatch with eyes, as "crawl-away" young, with either an extremely short or no swimming stage.

Siphonaria gigas was found to be effectively inedible, because of a bitter substance in the flesh. This may explain why *Siphonaria* are not eaten by such birds as the American Oyster Catcher, which avidly chisel other limpets off the rocks and eat them. Critically studied, more than 100 lots, approximately a thousand specimens, have clarified the smaller species of Panamanian shores.

The following checklist incorporates all necessary corrections of nomenclature and synonymy known to me. The geographic range of each species as recorded in the United States National Museum collection is included.

AMERICAN SIPHONARIIDAE

Genus SIPHONARIA Sowerby 1824.

Subgenus LIRIOLA Dall 1870.

Section LIRIOLA, s. s.

Genotype: *S. (Liriola) thersites* Carpenter 1864.

S. (LIRIOLA) THERSITES Carpenter 1864.

Unalaska, Aleutian Islands, to Port Etches and Sitka, Alaska, southward to Vancouver Island and the Straits of Juan de Fuca, Washington.

Section TALISIPHON Iredale 1940.

(+ Pachysiphonaria Hubendick 1945.)

Genotype: *S. (Talisiphon) virgulata* Hedley 1915.

S. (TALISIPHON) BRANNANI Stearns 1872.

Sta. Barbara Id., Catalina Island, to Cape San Lucas, Baja California.

S. (TALISIPHON) LESSONI Blainville 1824.

(+ *laeviuscula* Sowerby 1835, *lineolata* Sowerby 1835, *laevis* Philippi 1846, *antarctica* Gould 1846, *tenuis* Philippi 1860.)

From Payta, Peru, southward along the Chilean coast to Orange Harbor; Patagonia; Falkland Islands; northward along the Atlantic shores to Punta del Este, Uruguay.

Section PUGILLARIA Iredale 1924.

(+ Kerguelenia Rochebrune & Mabille 1889, preoccupied.)

Genotype: *S. (Pugillaria) stowae* Verco 1906.

¹ Published by permission of the Secretary of the Smithsonian Institution.

- S. (PUGILLARIA) LATERALIS Gould 1846.
(+ *redimiculum* Reeve 1856, *magellanica* Philippi 1857.)
Orange Harbor, Chile; Cape Maria, Tierra del Fuego, Patagonia, and the Falkland Islands. The South American member of a circum-antarctic group.

Subgenus SIPHONARIA, s. s.

Section HETEROSIPHONARIA Hubendick 1945.

Genotype: *S. (Heterosiphonaria) gigas* Sowerby 1825.

- S. (HETEROSIPHONARIA) AEQUILORATA Reeve 1856.
(+ *costata* Reeve 1856, *aequilirata* Carpenter 1856.)
Santa María Bay, Margarita Bay and Island, Cape San Lucas, Baja California; Gulf of California; Tres Mariás Islands.
- S. (HETEROSIPHONARIA) LECANIUM Philippi 1846.
Pescaderes Pt. and Cape Pulmo, Baja California; Cape San Lucas; Boca-chibampo Bay, Sonora; Mendia and Mazatlán, Sinaloa, southward to 10 miles north of Manzanillo, Colima.
- S. (HETEROSIPHONARIA) PICA Sowerby 1835.
Acapulco (type locality); Puerto Angeles, Oaxaca.
- S. (HETEROSIPHONARIA) MAURA Sowerby 1835.
(*lineolata* Reeve 1856.)
Corinto and San Juan del Sur, Nicaragua; Taboga Island, and Panama [City]; Pedro Gonzales and San José, Pearl Islands; Salinas, Ecuador, southward to (northern) Peru.
- S. (HETEROSIPHONARIA) PALMATA Carpenter 1856.
Cape Pulmo, Baja California; Cape San Lucas; Gulf of California to Mazatlán; Acapulco; Manzanillo, Colima; Puerto Angeles, Oaxaca; Guacamayo and Panama [City]; San José, Pearl Islands.
- S. (HETEROSIPHONARIA) GIGAS Sowerby 1825.
(+ *angulata* Gray 1825, *costata* Sowerby 1835, *characteristica* Reeve 1856.)
Costa Rica; Isla Coiba, Guacamayo, Taboga Island, and Panama [City]; Pedro Gonzales and San José, Pearl Islands; Cocos Island; Dept. Choco, west Colombia.

Section SIPHONARIA Sowerby 1824, s. s.

Genotype: *S. (Siphonaria) sipho* Sowerby 1824.

- S. (SIPHONARIA) ALTERNATA Say 1826.
(+ *lepidata* Gould 1846, *ferruginea* Reeve 1856, *brunnea* Hanley 1858, *intermedia* Davis 1904, *opalescens* Davis 1904.)
Bermuda; Plantation Key to Key West, Florida; Tortugas; Sarasota Island; Bahamas.
- S. (SIPHONARIA) PICTA Orbigny 1834.
(+ *subrugosa* Sowerby 1835; *brasiliiana* Reeve 1856, *hispida* Smith 1890.)
Fernando Noronha Island; Abrolhos Islands; Bahía, and Cabo Frío, Brasil.

Section MOURETUS Blainville 1824.

(+ *Patellopsis* Nobre 1886.)

Genotype: *S. (Mouretus) adansoni* Blainville 1824.

- S. (MOURETUS) PECTINATA Linnaeus 1758.²

² Only the valid American records and synonyms listed.

(+ *lineolata* Orbigny 1842, *lineata* Krebs 1864, *naufragum* Stearns 1872.) East Florida; Texas jetties; Vera Cruz, Mexico; Havana, Cuba; St. Thomas; St. Croix; Sta. Marta, Colombia; Aruba; Margarita Island; Trinidad.

S. pectinata was undoubtedly native only on East Atlantic shores. Introduced locally in the West Atlantic, it is unknown from the Pacific. The East Pacific records from Central America are based on the junior homonym *lineolata* Reeve 1856; those from South America are based on the senior homonym *lineolata* Sowerby 1835. Fortunately all three of these *lineolata* names are synonyms; there is less confusion with all of them out of use.

THE GENUS *CONUS* IN THE SOUTHERN CARIBBEAN. H. E. Coomans, American Museum of Natural History, New York City.

(Abstract)

The southern Caribbean area consists of the Caribbean side of Panama and Colombia, the coast of Venezuela as far as Trinidad, and includes the islands off the coast of Venezuela: three islands of the Netherlands Antilles (Aruba, Curaçao, Bonaire), and some Venezuelan islands, like Margarita.

The following species of *Conus* were collected by the author in the Netherlands Antilles (marked *), or were recorded from the lower Caribbean in the literature.

* *Conus regius* Gmelin, common from Florida to Brazil.

Conus cardinalis Hwass, rare, Florida and the West Indies. Mentioned from Curaçao by REEVE.

* *Conus cedonulli* ? Linné, Lamarck (= *dominicanus* Hwass), very rare. Bahamas, Antilles to Surinam.

* *Conus aurantius* Hwass, was for a long time believed to be an Indo-Pacific species, but there are no modern records from that area. It was mentioned by MÖRCH (1852) from the Antilles. The species is only definitely known from the Netherlands Antilles.

* *Conus spurius* Gmelin forma *atlanticus* Clench, rare in the southern Caribbean. This color form is restricted to the mainland: Florida and the coast of Central and South America. Typical *spurius* is Antillean.

* *Conus daucus* Hwass, common, Florida and the West Indies.

* *Conus granulatus* Linné, a rare species in the northern Caribbean, rather common in the south.

* *Conus ranunculus* Hwass, West Indies and West Africa. Very common in the southern Caribbean.

* *Conus bermudensis* Clench, originally described from Bermuda, later found in Florida, recorded here from Aruba. Rare.

Conus fosteri Clench & Aguayo, is a deep-water species, known from Florida and Cuba. Mentioned in "Johnsonia" (vol. 3, p. 329) from Venezuela.

Conus sennotorum Rehder & Abbott, was described from Yucatan, and is recorded from Aruba (Nautilus, vol. 71, p. 118).

* *Conus lorenzianus* Dillwyn (= *largillierti* Kiener pars), is an endemic species of the lower Caribbean.

* ?*Conus clerii* Reeve, is a Brazilian species. One specimen with the color pattern of *clerii* was collected in Curaçao, but might belong to the foregoing species.

- * *Conus mus* Hwass, common from Florida to Trinidad.
- * *Conus verrucosus* Hwass, Florida, West Indies to Brazil.
- * *Conus jaspideus* Gmelin, Florida and the West Indies.
- * *Conus pygmaeus* Reeve, endemic in the southern Caribbean, from Panama to Trinidad.
- * *Conus columba* Hwass, was mentioned from the West Indies. However, CLENCH did not cite any records from the Western Atlantic (Johnsonia, vol. 1, no. 6, p. 39). I collected a few specimens in Aruba, and know the species from Margarita, Antigua and St. Martin.
- * *Conus armillatus* C. B. Adams, a rare species, unknown since its description, was collected in the Netherlands Antilles and recognized by ABBOTT (Nautilus, vol. 71, p. 117). Endemic in the southern Caribbean.

Nineteen species from the lower Caribbean are mentioned here, six are endemic to the area. Some of the others are more common in the southern than in the northern part of the West Indies. A number of northern Caribbean Conidae are not found in the south.

VARIATION AND SUBSPECIFIC DIVISIONS WITHIN *AEQUIPECTEN IRRADIANS* (LAMARCK). Arthur H. Clarke, Jr., National Museums of Canada, Ottawa, Ontario, Canada.

(Abstract)

Examination of a large series of *Aequipecten irradians* from Sable Island, Nova Scotia, has shown that this population differs significantly from all other populations of the species. It exhibits unusually high rib count, low right valve convexity, low relative width, and low frequency of white right valves. Radiocarbon dating of the shells also indicated an age of approximately 1,445 years and confirmed the suspicion that the species is now extinct at Sable Island. On temporal and geographic grounds the population qualifies as a distinct subspecies. The 1,445 year age is difficult to interpret. It is much later than the hypsithermal warm period (7,500 to 5,000 years ago) and, if correct, may coincide with a later warm period when a warm-water fauna extended continuously from Cape Cod to Prince Edward Island.

Comparison of samples from living *Aequipecten* populations distributed from Massachusetts to Colombia has confirmed the status of *irradians s. s.* and *irradians concentricus* as subspecies. The "subspecies" *amplicostatus* behaves as a full species however and should be regarded as such. The original locality of Lamarck's *Pecten irradians* is unknown but photographs of his types agree closely with some specimens from New Jersey. Say's *concentricus* is also from New Jersey. Unfortunately, New Jersey is in the transition zone between "typical" *irradians* and *concentricus* but regional differences appear to exist. Further collecting in that area is necessary.

South of New England the frequency of white or nearly white right valves in all *Aequipecten* populations rises abruptly from approximately 25% to nearly 100%. It is suggested that this has resulted from natural selection which is strongly climatic in the north and strongly biological in the south. Individual dimorphism or chromatic apostasis in pectens (and in many other animals as well) when expressed during the attempt to escape from predators may be of significant survival value.

SHELLS AND THEIR KEEPERS; A WORLD TOUR OF MUSEUM MOLLUSK COLLECTIONS. G. Alan Solem, Chicago Natural History Museum.

(Abstract)

On a 14-month study trip, Dr. Solem visited museums from Hawaii to Australia and through Europe. A very revealing set of photographs illustrated the variety of techniques for care of specimens and gave informal portraits of many of the famous foreign malacologists.

The midday break signaled a muster on the Museum steps where a group photograph was made, this followed by a buffet luncheon in the Hall of Plant Life. The afternoon program:

THE HYPERSTROPHIC LARVAL SHELLS OF THE ARCHITECTONICIDAE.¹ Robert Robertson, Academy of Natural Sciences, Philadelphia.

(Abstract)

Now that the Pyramidellidae have been transferred from the Prosobranchiata to the Opisthobranchiata, the Mathildidae and Architectonicidae are the only living families still classified, despite their hyperstrophic protoconchs, in the Prosobranchiata. Numerous opisthobranchs and a few primitive pulmonates also have hyperstrophic protoconchs and orthostrophic teleoconchs.

The term heterostrophic applies to the hyperstrophic protoconchs of pyramidellids and to similar protoconchs of other groups, including mathildids. Recognizing that architectonicid protoconchs differ from heterostrophic protoconchs, Dautzenberg and Fischer (1896) proposed for them the term "anastrophic." The apex of the false spire of an anastrophic (architectonicid) protoconch shows through the umbilicus of the teleoconch, while the apex of a heterostrophic protoconch projects at an oblique angle from the tip of the spire of the adult shell.

The angle between the axis of coiling of every hyperstrophic protoconch and the axis of its attached teleoconch is always less than 10° in architectonicids and always (except in some greatly reduced shells) more than 45° in other groups, usually 70° to 90°. The angle difference results from the differing positions of the apex of the false spire. The Architectonicidae is the only family having hyperstrophic protoconchs and broadly conical or discoidal teleoconchs, usually with a wide umbilicus. Most of the other groups have high-spined shells lacking an umbilicus into which the apex of a false spire could project. Thus, the differences between anastrophy and heterostrophy seem to be of minor systematic significance. Presumably, all gastropods with hyperstrophic (anastrophic or heterostrophic) protoconchs are monophyletic.

Throughout the Architectonicidae (including the Heliacidae of authors), the protoconchs are remarkably uniform. All members of the family probably have pelagic larvae because in none is the hyperstrophic protoconch known to be reduced. Every architectonicid protoconch is wide, and has a low, flat, or even slightly depressed false spire (visible through the umbilicus),

¹ Abstracted from "A Study of the Hyperstrophic Larval Shells of the Architectonicidae" (in preparation for MALACOLOGIA).

and rounded, inflated whorls; their surface is smooth and shiny, and the peritreme is thickened, forming a varix. In color, the protoconchs resemble or contrast slightly with the teleoconch.

Despite their relative uniformity, there are specific and even generic characters among architectonicid protoconchs: (1). Size. In maximum diameter, they range from 0.5 to 1.7 mm. Within a given species, the diameter is fairly constant, never varying more than 23% (± 0.14 mm.) and usually less than 23%. The number of whorls (2 to $3\frac{1}{2}$) is roughly proportional to the diameter. The diameter is not proportional to the size of the full-grown teleoconch; various species of *Philippia* and *Architectonica* have the largest protoconchs. (2). Anal keel. On *Philippia*, a prominent keel adjacent to the anus—visible on the false base—extends from the varix to near the start of the suture. A less prominent anal keel is also present (rarely obscure or absent) on *Architectonica*. The genera *Acutitectonica*, *Gyriscus*, *Heliacus*, and *Spirolaxis* lack an anal keel.

The hyperstrophy of the protoconch abruptly changes to orthostrophy when the teleoconch starts to grow.² This change does not necessarily coincide with the definitive settlement of the larva from the plankton because there is evidence suggesting that there may be a "swimming-crawling" larval stage of variable duration. Throughout nearly all the Architectonicidae, a growth line—highly variable in position even within a species—can usually be observed on the first half whorl of the teleoconch. At least one genus (*Heliacus*) includes host-specific symbionts (with zoanthinarian sea anemones).³ I suggest that the growth line records the time at which the "swimming-crawling" stage ends and the larva settles definitively to the bottom (*Heliacus* spp. near or with their hosts).

OBSERVATIONS ON EMBRYONIC SHELL SCULPTURE OF SOME FRESHWATER SNAILS, *AMPHIGYRA* AND *NEOPLANORBIS* IN PARTICULAR. Harold J. Walter, University Museums, Ann Arbor, Michigan.

(NO ABSTRACT SUBMITTED)

SOME NOTES ON THE REGENERATION OF SHELL IN *ONCOMELANIA FORMOSANA*.¹ George M. Davis, University Museums, Ann Arbor, Michigan. (Read by Robert H. Wakefield)

(Abstract)

Shells of mature, 4.5–6.5-mm. long snails were drilled in the third whorl from the aperture. The disturbed area averaged 0.4 mm. square. The snails were maintained at room temperature (23°C) in petri dishes on a filter paper base which was flooded with balanced saline.

Regenerating shells at different stages of development were removed, mounted in glycerine jelly, and studied under the light and phase microscopes.

One day after penetrating the shell an opaque, mucoid secretion was noticed over the surface of the exposed epithelium. On the second day a

² For discussion of two abnormal exceptions, see R. Robertson & A. S. Merrill, "Abnormal Dextral Hyperstrophy in Post-larval *Heliacus*" (The Veliger, 6(2), October 1963).

³ Information being prepared for publication.

¹ This work was supported, in part, by a contract with the U.S. Army Medical Research and Development Command and sponsored by the Commission on Parasitic Diseases, Armed Forces Epidemiological Board.

fine membrane formed at the inside edge of the drilled hole on the surface of the secretion. The membrane "grew" out from the edge of the hole becoming completed, on the average, in three days.

The membrane attached to the shell surface. When the body tube pressed continually against the hole the membrane formed just across the hole or up inside the hole. When the body tube pressed against the shell at a distance from the edge of the hole, the membrane attached to the shell where the body tube made contact with the shell. In the latter case the membrane was not limited to the area of shell around the hole but encircled the body tube leaving open only that space where the body tube pressed against the columella. In this instance, as shell regenerated along the contours of the membrane, a new tubular section of shell formed inside the old shell.

At 1,500 magnification the 4-micron thick membrane appeared acellular, proteinaceous, and porous. Each porous unit measured about 0.25–0.30 microns in diameter.

As the membrane formed, minute granular deposits appeared on the membrane's outer surface. These deposits which were about 0.40–0.50 microns in diameter "grew" into complex crystals which finally fused with other crystals forming a regenerated shell layer between 6 and 20 days.

Two types of crystals were observed. One type formed as the granular deposit elongated along one axis into a tear-shaped structure 14–18 microns long. Several of these units commonly developed around a central point forming a radial pattern. The tear-shaped crystals branched, the radial complex fused forming a complex, multidimensional structure called a "spherulite." When the "spherulite" reached a diameter of 40–50 microns the individual branches began to lose their identity and further deposits of calcareous materials were added in concentric layers. At this point the many developing "spherulites" "grew" into each other forming a shell of rough polygonal units.

The second crystal type developed from the initial granular deposits as flat, very thin discs which often developed three or four lobes on the same horizontal plane. "Growth" of these crystals occurred by regular, concentric additions of calcareous material. These scale-like units coalesced forming a shell of smooth, polygonal units.

The two systems often occurred on the same membrane in which case the shell possessed both smooth and rough surfaces.

With calcification of the primary membrane, many subsequent membranes were laid down beneath the first membrane, each becoming calcified in two ways: 1) by supporting the growth of scale-like crystals above the membrane so that there developed an alternating pattern of shell-membrane-shell-membrane; 2) by calcification within the membranes.

CYTOLOGICAL STUDIES OF *POMATIOPSIS* SNAILS.^{1, 2} C. M. Patterson, University of Michigan, Ann Arbor, Michigan.

(Abstract)

Hybridization between various species within the oriental snail genus *Oncomelania* (Komiya and Kojima, *Jap. J. Med. Sci. and Biol.*, 11: 185–

¹ This investigation was supported (in part) by a research grant, G-21910, from the National Science Foundation, Washington, D. C., U.S.A.

² Contribution No. 3, Intermediate Hosts of Schistosomiasis Program, Institute of Malacology.

186; Wagner and Chi, *Amer. J. Trop. Med. and Hyg.*, 2: 195–198), and between *O. quadrasi* and its North American relative, *Pomatiopsis lapidaria*, have been reported (van der Schalie, Getz and Dazo, *Amer. J. Trop. Med. and Hyg.*, 11: 418–420). However, a thorough study of hybridity involves cytological analyses of hybrids, their offspring and various backcrosses. Before such a study can be made, it is necessary to have a clear cytological analysis of the parental species. Therefore, the initial objectives of the present study are to demonstrate aspects of normal cytology in pomatiopsisid snails (*Pomatiopsis* and *Oncomelania*). With this information at hand, cytological variations appearing in hybrids can be detected more readily. Such variations will perhaps provide a cytological basis for establishing the phylogenetic relationships among these snails, and may also indicate a systematic placement of the species which otherwise would be impossible to establish on morphological characters alone.

The material examined in the present study consisted of the snail's gonadal tissue stained by the acetic-orcein squash technique for chromosome studies or stained with haematoxylin and eosin for general histological studies of gametogenesis.

The processes of mitosis and meiosis in *Oncomelania* and *Pomatiopsis* do not seem to differ from that generally occurring in other animal groups. In mitosis and meiosis the chromosomes are observed to resemble thin filaments in the early prophase stages of cell division and gradually contract and shorten, while their staining becomes more noticeable as the processes continue. During late prophase and early metaphase the centromere, and occasionally secondary constrictions, appear as non-staining or lightly staining areas. Spindle formation, synapsis, terminalization of chiasmata, cytokinesis and nuclear reconstruction appeared to be normal in these snails. Atypical spermatogenesis, reported to occur in other streptoneuran snails, was not observed in *Oncomelania* and *Pomatiopsis*.

Mitotic metaphase chromosomes are metacentric, submetacentric or acrocentric and measure 10.5 to 3.7 micra long in squash preparations of early mitotic metaphase cells. The sex chromosomes usually appear significantly different from the autosomes, and they are the largest elements of the chromosomal complement. The sex-determining mechanism in *Pomatiopsis lapidaria* appears to be the XO type because of this species chromosome number ($2n = 33$ in males). However, in *P. cincinnatiensis* ($2n = 32$ in males) and in *Oncomelania formosana* ($2n = 34$), the sex-determining mechanism appears to be the XY type. Whether or not more than two chromosomes of each complement are involved in sex determination has not been determined.

When snail species of different sex-determining mechanisms are hybridized, sex determination of the hybrid offspring can be expected to vary according to the cross. In *Oncomelania-Pomatiopsis* hybrids, for example, male *O. formosana* \times female *P. lapidaria* would presumably yield XX females and XY males. The reciprocal cross, i.e., female *O. formosana* \times male *P. lapidaria*, would yield XX females also, but the males would have the XO sex-determining mechanism.

A CYTOLOGICAL STUDY OF AFRICAN BULININE SNAILS, VECTORS
OF URINARY SCHISTOSOMIASIS.^{1, 2} John B. Burch, University of
Michigan.

(Abstract)

The Bulininae comprise a group of freshwater snails of the Basommatophoran family Planorbidae. The subfamily as presently understood, comprises two genera: *Bulinus*, occurring in the African region and the Near East, and *Indoplanorbis*, restricted to the Indian region. *Bulinus* is a widespread genus of many nominal species which have resulted from the perplexing morphological variability found within and among the populations, and systematists' poor understanding of this variability.

The genus *Bulinus* is of cytological significance because it contains species which undoubtedly have had polyploid origins (Burch, 1960, *Z. Tropenmed. Parasit.*, 11(4): 449-452). The genus is of medical importance because various of its members are the intermediate hosts of schistosomiasis haematobia in Africa and the Near East. Cytology of its species has a special interest from the standpoint of medical zoology since there may exist a possible connection between polyploidy and susceptibility to infection with schistosomes, (Burch, *op. cit.*).

The various species of the genus *Bulinus* have been traditionally grouped into three taxa (often referred to as subgenera): *Bulinus* s.s., *Physopsis* and *Pyrgophysa*. *Bulinus* s.s. comprises two species groups: the "truncatus group" in northern and central Africa (and the Near East), and the "tropicus group" in central and south Africa. The present investigation deals only with species of the subgenus *Bulinus* s.s.

The subgenus *Bulinus* s.s. has a geographical distribution which, in general, covers the entire African continent. Species of the more northern "truncatus group" serve as intermediate hosts for *Schistosoma haematobium* and allied herbivore schistosomes; the more southerly located "tropicus group" does not.

Bulinus truncatus truncatus, *B. truncatus rohlfsi* and *B. coulboisi*, all belonging to the "truncatus group", have 36 pairs of chromosomes. *B. sericinus* from West Aden Protectorate, also of that group, has 72 pairs of chromosomes. These species are considered to be polyploid since they contain exact multiples of the number of chromosomes ($n = 18$) usually found in most other species of the family and also in the "tropicus group" (*B. tropicus tropicus*, *B. tropicus angolensis*, *B. tropicus zanzebaricus*; *B. natalensis* has mostly 19 elements present at meiotic metaphase I, but some cells have 20 and 21). Coupled with these high polyploid chromosome numbers is a susceptibility to infection with *S. haematobium*.

Polyploidy, *per se*, may not be directly responsible for susceptibility to schistosome infection in the "truncatus group", but it is strongly suggestive that polyploidy was a key factor in the origin of that group. Coupled with this, either originally or evolving through the group's reproductive isolation from the "tropicus group", were physiological traits allowing for infection with *S. haematobium*.

The practical implications of these cytological findings are clear. In

¹ Contribution No. 2, Intermediate Hosts of Schistosomiasis Program, Institute of Malacology.
² This investigation was supported (in part) by a research grant, 5 T1 AI 41-05, from the National Institute of Allergy and Infectious Diseases, U.S. Public Health Service.

regions of geographical overlap it is exceedingly difficult to differentiate the two species groups, but one is capable of being infected with *S. haematobium*, the other is not. Because of the apparent complex overlapping variation of morphological characters exhibited by both species groups, specialists have yet to uncover clear-cut characters on which to make specific determinations. And many populations are almost impossible to assign to one species group or the other. By using chromosome numbers as separating criteria, perhaps other more gross differentiating characters can be found which will prove useful for easily separating species of the two groups in critical areas. Chromosome number determinations may therefore prove of value in helping solve some of the complex taxonomic problems of the snail vectors. Such chromosome number determinations may also prove helpful in discerning which field populations of *Bulinus* s.s. are capable of transmitting schistosomiasis and which populations are not.

NATURAL AND EXPERIMENTAL INFECTION OF LOUISIANA
SNAILS WITH THE BLOOD FLUKES.¹ Emile A. Malek, Tulane University.

(Abstract)

In a study of the ecology and distribution of the freshwater snails of Louisiana the following snails were collected: *Ammicola limosa* (Say), *A. integra* (Say), *A. binneyana* (Hannibal), *Littoridina monroensis* (Frauenfeld), *Pomatiopsis lapidaria* (Say), *Viviparus georgianus* (Lea), *Campeloma floridense* (Call), *Neritina reclivata* (Say), *Pomacea* sp. introduced, *Lymnaea* (*Pseudosuccinea*) *columella* (Say), *Lymnaea* (*Fossaria*) *cubensis* (Pfeiffer), *Physa anatina* (Lea), *Ferrissia dalli* (Walker), *Helisoma trivolvis lentum* (Say), *Helisoma costaricense* (Preston), *Gyraulus* sp., and *Tropicorbis obstructus* (Morelet).

Of these snails *Lymnaea* (*Fossaria*) *cubensis* is a natural host for the mammalian blood fluke of the southern states *Heterobilharzia americana* (in raccoon, dog, nutria, and marsh rabbit), and together with *Lymnaea* (*Pseudosuccinea*) *columella* are good laboratory hosts for this blood fluke. *Tropicorbis obstructus*, which is well distributed in the southern and central part of the state, had been found to be a potential host for the human blood fluke *Schistosoma mansoni* (Cram et al., 1945, McQuay 1952, 1953, Brooks 1953, Kuntz 1952). In the present studies, none of the field-collected nor of the laboratory-reared tropicorbid snails in Louisiana became infected when exposed to the miracidia of *Schistosoma mansoni*. It is believed that the susceptible colonies from lakes on the Baton Rouge campus have disappeared. Attempts are being made to locate any remnants of these colonies in the Amite River drainage. Only preliminary studies were carried out to test the susceptibility of *Pomatiopsis lapidaria*, a potential host of the Oriental human blood fluke *Schistosoma japonicum*.

STUDIES OF THE BIOLOGY OF *POMATIOPSIS* AND *ONCOMELANIA*,
SNAIL INTERMEDIATE HOSTS OF ORIENTAL BLOOD FLUKE
(*SCHISTOSOMA JAPONICUM*). Henry van der Schalie, University of
Michigan.

(NO ABSTRACT SUBMITTED)

¹ This investigation was supported by research grant AI 02898 from the National Institutes of Health, U.S. Public Health Service.

This paper closed the afternoon session, the omnibus was waiting and transported everyone to the University of Buffalo on the eastern edge of the city. Here in Norton Hall, the University's new and ultra-modern Student Union, a banquet-style dinner was served and was followed by entertainment of a most unique nature.

Dr. John Storr, staff biologist, is an unexcelled raconteur, photographer extraordinary and an expert chalk artist. It was in the latter medium that he began a delightful hour; in telling of his hobby of underwater photography, in rapid succession he sketched one and then another denizen of the reef.

Changing then to motion pictures he treated his audience to "you are there" action shots of fishes, sponge, coral and echinoderms, and of course mollusks. It was a delightful evening.

* * *

On Thursday all of the sessions were held in the Georgian Room of the hotel, beginning with routine announcements made by President Mead and greetings sent from absent members Arthur Merrill, Harald Rehder and Letha Allen. The following papers occupied the morning hours:

PRELIMINARY REPORT—PLEISTOCENE NON-MARINE MOLLUSCA OF NORTHEASTERN WISCONSIN. Edward C. Roy, Jr., Ohio State University.

(Abstract)

The study of Pleistocene Mollusca brings out an intimate relationship between the two sciences of geology and biology. Northeastern Wisconsin offers the opportunity to study mollusks in one of the most recently glaciated regions of the United States. Both qualitative and quantitative approaches are used in this investigation. The primary goals are the following: determination of which species of mollusks first invaded the area after deglaciation; reconstruction of the ecology of each deposit studied and noting of any changes in environment that might be reflected by the mollusks; comparison of the faunas and of the paleoecology of the five major deposits; a study of the glacial geology of the region as a whole and of each deposit in particular to try to determine the origin of the former bodies of water. If possible, radio-carbon dates of wood collected in the deposits will be made as well as a survey of the pollen.

Fifteen marl sites were sampled in 7 counties of northeastern Wisconsin. Of these, five sites were collected stratigraphically from top to bottom at 2 inch intervals. All the deposits are located on drift of either the Cary or the Valdres substage of the Wisconsin glaciation. Three of the deposits are located along the Mountain moraine which trends approximately north-south in this region. Of the other two deposits, one is located to the west of the moraine and the other to the east of it. The ten other sites were sampled at random, and these will be used to give a broader account of the fauna of this region.

A comparison will be made between the fossil mollusks and those living in northeastern Wisconsin today to try to determine routes of migration and signs of extinction.

PRELIMINARY REPORT ON PLEISTOCENE FRESHWATER MOLLUSCA FROM THE GASPÉ PENINSULA. Joseph F. Schwietering, Ohio State University.

(Abstract)

Twenty freshwater marl lakes were visited and sampled during the summer of 1961. In all of the lakes sampled, fossil mollusks were found in the marl. Living mollusks were collected from a few of the lakes. Four lakes located in the northwestern part of the Gaspé Peninsula were selected for detailed study during the summer of 1962. These four lakes were mapped and auger samples were collected around the margins of the lakes. At each lake a pit was dug into the marl and samples were collected at two-inch intervals from the top to the bottom of the pit. A preliminary examination of the maps and samples indicates that all of the lakes rest on glacial deposits, are post-Wisconsin in age, and contain fewer species of freshwater mollusks than the freshwater marl deposits studied in Ohio.

THE DISTRIBUTION, ECOLOGY AND LIFE HISTORY OF THE MUSSEL, *ACTINONAIAS ELLIPSIFORMIS* CONRAD, IN MICHIGAN. Henry van der Schalie, University of Michigan.

(Abstract)

Previous work has shown that two Michigan mussels have a strikingly restricted distribution pattern. One of them, *Actinonaias ellipsiformis* (Conrad), is found only in southern rivers of the Lower Peninsula that drain to Lake Michigan and into Saginaw Bay; it does not occur in any of the southeastern drainages. These studies are preliminary to work contemplated on the fish-host relationship of this mussel.

A. ellipsiformis was collected every month when it was active over a ten year period. The data indicate that it is a long-term (bradyctictic) breeder carrying glochidia in its marsupia from August to late spring. The number of ovisacs with young depends on the age and size of the animal so that the number of filaments with young range between 9 and 25 per gill with an average of about 20. This mussel does not become mature until the third year; the oldest specimen, estimated on the basis of number of annuli on the shell, was 12 years. Of the 218 specimens sectioned for this study of gonad development, only 16 lived beyond the 7th year. It was often difficult to determine age accurately using the annular ring method; the need for better techniques in age determination must be stressed. Of the total number sectioned the ratio of males to females was about equal.

One peculiar hermaphrodite was discovered in which oogenesis and spermatogenesis was taking place simultaneously in the same acini of the gonad. Otherwise hermaphroditism in this species was quite rare. Parasitism was relatively uncommon but where it occurred at one station females were rendered virtually sterile by a developing trematode.

Some 16 species of fish were found in the water flowing over a coarse gravel and sand habitat in the small streams where this mussel lives. Since all of these fish are known to range into southeastern Michigan it must be presupposed that the mussel did not cross the low divide separating the western and southeastern drainages in Michigan. Additional life history studies are needed to understand better this fish-host relationship.

NOTES ON THE NAIAD FAUNA OF THE OLENTANGY RIVER IN
CENTRAL OHIO. Carol B. Stein, Ohio State Museum, Columbus, Ohio.

(Abstract)

The Olentangy River, tributary of the Scioto River of the Ohio system, drains an area of 536 square miles of glacial till plain in north central Ohio. Twenty-nine species of Unionidae have been collected from this drainage. Of these, *Elliptio crassidens* (Lamarck 1819), *Actinonaias carinata* (Barnes 1823), and *Dysnomia torulosa* (Rafinesque 1820) are known only from a very few subfossil shells, and are probably now extirpated from the Olentangy. *Cyclonaias tuberculata* (Rafinesque 1820), *Pleurobema clava* (Lamarck 1819), *Lasmigona compressa* (Lea 1829), *Simpsoniconcha ambigua* (Say 1825), and *Obovaria subrotunda* (Rafinesque 1820) have been found only as dead shells but may still be maintaining low-level populations. Living specimens of the following 21 species have been collected within the past seven years: *Fusconaia flava* (Rafinesque 1820); *Amblema plicata* (Say 1817); *Quadrula cylindrica* (Say 1817); *Pleurobema cordatum* form *coccineum* (Conrad 1836); *Elliptio dilatatus* (Rafinesque 1820); *Unio merus tetralasmus* (Say 1830); *Lasmigona costata* (Rafinesque 1820); *Anodonta grandis* (Say 1829); *Anodonta imbecillis* (Say 1829); *Anodontoides ferussacianus* (Lea 1834); *Alasmidonta calceolus* (Lea 1829); *Alasmidonta marginata* (Say 1818); *Strophitus undulatus* (Say 1817); *Ptychobranchus fasciolaris* (Rafinesque 1820); *Carunculina parva* (Barnes 1823); *Villosa iris* (Lea 1829); *Villosa fabalis* (Lea 1831); *Lampsilis radiata siliquoidea* (Barnes 1823); *Lampsilis ovata* form *ventricosa* (Barnes 1823); *Lampsilis fasciola* (Rafinesque 1820); and *Dysnomia triquetra* (Rafinesque 1820).

The number of species tends to increase with the distance downstream, but this increase is interrupted by a large flood-control dam in northern Delaware County and again below the sewage treatment plant of the city of Delaware. Another slight decrease in number of species present occurs below the Fifth Avenue Dam in Columbus, 1½ miles above the river's mouth. This decrease in variety seems to be accompanied by an increase in size of individuals present. An isolated relict population of the formerly widespread mussel *Unio merus tetralasmus* exists in this portion of the Olentangy River between Fifth Avenue Dam and its confluence with the Scioto River. Since *U. tetralasmus* is known west of Ohio as a pond and creek form, its persistence in the rocky riffles and runs below the dam is an enigma.

COMPARISON OF THE MOLLUSKS IN IPSWICH BAY AND GLOUCESTER HARBOR AT CAPE ANN, MASSACHUSETTS, 1958-1961.
Ralph W. Dexter, Kent State University, Kent, Ohio.

(Abstract)

Marine mollusks have been studied at Cape Ann, Massachusetts, since 1933. Dredging for subtidal mollusks began in 1934. Earlier studies have already been published. Between 1958-1961, a series of dredgings was carried out in Ipswich Bay and Gloucester Harbor. Ipswich Bay has a bottom of hard sand with a rocky margin. A total of 83 dredge hauls was made to a depth of about 60 feet at mean low water. Gloucester Harbor has a bottom of soft mud with a rocky margin and was sampled with 89 dredge hauls to a depth of about 40 feet at mean low water.

Intertidal species and species collected by other means are not included here since the comparison is based entirely on dredge samples.

Cape Ann is a promontory some 30 miles north of Boston and forms the northern boundary of Massachusetts Bay. Ipswich Bay faces the north while Gloucester Harbor faces the south, and the two are connected by a narrow tidal inlet known as the Annisquam River.

A total of 33 species was collected in the dredges (2 chitons, 14 snails, 17 bivalves). Twenty-three species were found in common in the two bodies of water. Thirty species were collected in Ipswich Bay and 26 species in Gloucester Harbor. Seven species were found only in Ipswich Bay while three were found only in Gloucester Harbor. In general, there were more species of snails and sand-inhabiting bivalves in the Bay with more mud-inhabiting species in the Harbor. Five species showed a greater abundance in Ipswich Bay while four showed notably greater abundance in Gloucester Harbor. However, the populations in general were more alike than they were different. The differences in composition are largely the uncommon species, and the differences in abundance are, for the most part, not great.

Acknowledgment is made to the U.S. Atomic Energy Commission, Contract No. AT(11-1)-411 for assistance on this project.

AN INTRODUCED SLUG. Dolores S. Dundee, Louisiana State University in New Orleans.

(NO ABSTRACT SUBMITTED)

STATOLITH FORMATION IN *POMACEA PALUDOSA* (SAY).¹ Andrew McClary, University of Wisconsin at Milwaukee.

(Abstract)

Statoliths or otoconia are minute calcareous granules located within statocysts. The latter are presumed to function in molluscs as organs of balance and geotactic orientation.

The statocysts of *Pomacea paludosa* are elliptical organs situated laterally to each pedal ganglion. Each statocyst contains from 5 to over 500 rectangular crystalline statoliths. The statoliths of *P. paludosa* are probably formed from calcium stored in spherules which lie in the connective tissue surrounding each statocyst. Sections stained by the method of Dahl indicated that spherules, statocyst walls, and statoliths all contain considerable amounts of calcium.

Various aspects of statolith formation were studied, using colonies of snails maintained under controlled conditions. Subject snails were fixed in neutral formalin. Statocysts were then removed, placed in water on slides, and opened to remove statoliths. After drying, statoliths were mounted in balsam.

Two colonies of snails, each hatched from a single egg mass, were used in a study of statolith growth. One colony supplied snails of 0-25 days' age. At 5-day intervals, 4 snails were taken from this colony and fixed. The second colony supplied snails of 30-200 days' age. At 10-day intervals, 5 snails were removed from this colony and fixed. The average number of statoliths in a statocyst was found to increase with snail age. Thus, the statocysts of one-day-old snails contained an average of 8 statoliths. This number

¹ This investigation was supported by National Science Foundation Grant No. NSF-G-19373.

steadily increased until 120 days, when statocysts contained an average of 396 statoliths. The statocysts of snails over 120 days' age contained variable numbers of statoliths. Statoliths typically varied widely in size. Therefore, it was decided to use the averaged length of the 10 largest statoliths in each statocyst as an index of size. Using this index, it was found that statolith size increased with both snail age and snail weight. Thus, when snails were one day old and weighed an average of 0.004 gm the average size of the largest statoliths was 30 microns. This figure increased to 90 microns by 180 days, when snails averaged 9.2 gm in weight. Experiments were designed to determine whether statolith size was a function of snail age, weight, or both age and weight. Snails used in this study were 0-30 days in age. All were from a single egg mass. By means of crowding, some of the snails were stunted. In this way, snails of equal age, but unequal weight were obtained. It was found that snails equal in weight but differing in age showed no significant difference in statolith size. In contrast, snails equal in age, but differing in weight showed significant differences in statolith size. Thus, for young snails, statolith size was a function of snail weight rather than age.

OTALA LACTEA MÜLLER LIFE HISTORY. Bernice Plummer, Rochester, New York.

(Abstract)

In September 1960 I purchased several live *Otala lactea* snails for their pretty shells but found the animals so interesting that I made a terrarium for them. I fed them lettuce, cabbage leaves, mushrooms, bananas, grapes, apples, watermelon, and cucumber. When pea vines or molded leaves were added they relished them. They also liked a few drops of olive oil.

About 14 days after copulation one snail thrust its head deep down into the soil and started laying gelatinous, tapioca-sized eggs in a grape formation, the first laid being at the top. It took her 24 hours to lay the 50 eggs.

In 20 to 24 days the eggs turned a shiny sandy color and began emerging as living embryos, crawling directly to the top of the terrarium. The first embryo died within a few hours. About the same time I discovered that the adults were nibbling chunks out of one another's shell. When I sprinkled bone meal and powdered shell on their food and made balls of plaster of paris on which powdered calcium carbonate was rubbed at intervals, the activity of the snails increased and the young survived.

The first year they aestivated during November but since then they have aestivated during most of March. I found that the aestivation period is the only time that *Otala lactea* repair their shells.

One day, as I placed a tray of food in the terrarium, a snail crawled under it and his shell was badly cracked. There was a hissing sound and nearly $\frac{1}{2}$ teaspoon of pallial water oozed out. During aestivation he mended his shell and added $\frac{1}{4}$ inch to the lip. The older snails added $\frac{1}{16}$ inch to their shells while the very young added as much as $\frac{1}{2}$ inch.

When one year old, the flat shell changed and the apex began to protrude from the center; the second year the lip thickened; at $2\frac{1}{2}$ years the lip flared backward and at 2 years 8 months they laid eggs.

When the terrarium became too dry, they made an ephigram over the aperture. One of them made a double ephigram with an air space between the two layers.

They travel at the rate of one inch per minute on glass but more slowly on ground or foliage.

DISEASE, DECLINE AND PREDATION IN THE GIANT SNAIL POPULATIONS OF HAWAII.¹ Albert R. Mead, University of Arizona.

(Abstract)

The predicted decline in the Hawaiian populations of *Achatina fulica*, first reported at the Montreal meetings in 1960, has continued to the point where, for example, the Mahinui population is scarcely 15% of what it was in 1955. The incidence of disease has increased to 94%. A general population degeneracy of striking proportions is taking place—diminutive, thin, brittle, pale individuals with excessive, amorphous deposition of calcareous material around the shell aperture and little or no periostracum are appearing in predominant numbers in the older populations. This is the same phenomenon observed in Micronesia in 1949. The disease is apparently cyclic, with a peak of mortality in June; it is producing a greater intensity of symptoms; and it may be contributing to the extremely high mortality in the egg masses. Recovery of marked individuals has permitted determining fairly accurately the age of the individuals. The disease seems to be producing a lowered resistance and a lowered physical resilience with the result of a higher death rate in response to a variety of stress factors. A research team in Hawaii and Arizona is exploring the etiology and histopathology of the disease. Although a pseudomonad has been found in the lesions as a possible secondary contaminant, virological explorations are being continued, using fluorescent antibody and tissue culture techniques. The puncturing of the flesh of the snail by isopods has implicated them as possible vectors. Great changes are taking place in the associated snails. *Bradybaena similaris*, shown to be contracting the disease in 1957, has disappeared in certain areas where it was formerly abundant. The introduced, predatory *Euglandina rosea* is providing less hope for biological control since it has moved beyond the giant snail populations. This leaves the egg-eating *Gonaxis quadrilateralis* as the principal, but limited, introduced biological control agent. A Hawaiian endemic terrestrial turbellarian worm, *Geoplanea septemlineata*, was discovered to be the only invertebrate predator that can kill a full-grown giant snail. It was found to be contributing considerably to an already exceedingly complex ecology of terrestrial snails in Hawaii as it preys upon the introduced predatory snails and recently has been found to carry eosinophilic meningocephalitis to humans.

REPORT OF PROGRESS ON A NEW "NAUTILUS" INDEX. Aurele La Rocque, Ohio State University.

(ABSTRACTED FROM PREFATORY NOTE)

In April of 1962, the NAUTILUS completed its seventy-fifth volume and a milestone had been reached in the history of this, the oldest surviving North American malacological journal. To mark the occasion and to honor those who have kept the NAUTILUS alive these many years, this author index,

¹ This research was supported by National Institutes of Health Grants AI O-1245-04 and -05.

which records the contributions that have appeared in the NAUTILUS and its predecessor the CONCHOLOGIST'S EXCHANGE, is issued.

Two indexes to the NAUTILUS have been previously published, one in 1927 (volumes 1-34) and another in 1951 (volumes 35-60). Both are now out of print and it is not likely that they will be reprinted individually. It should be noted that the two previous indexes contain both author and systematic indexes. Should the present index be well received, it may be possible to prepare a companion volume with a systematic index to all seventy-five volumes of the NAUTILUS.

This index differs in some particulars from its predecessors. Many titles omitted from the first index have been included here and a few minor corrections have been made; pages are given in full and references to plates and figures have been added. The list of obituaries at the end of the alphabetical list of titles is complete for all seventy-five volumes.

In this author index, reviews are clearly noted by being preceded by the words "REVIEW OF." Spaced letters are used instead of underlining to indicate italics. The double dash (—) indicates the end of the title quoted and precedes the volume, number, and page of the NAUTILUS on which each article starts.

The compiler will be glad to hear of errors of omission or commission that may be detected in this index and promises to issue a list of errata if that should be necessary.

That the 279 page index had been compiled came as complete surprise to everyone except members of Dr. LaRocque's staff who had assisted in its preparation. It is dedicated to Dr. Horace B. Baker for whom Dr. LaRocque had prepared a bound and inscribed copy. He generously distributed unbound copies to a number of persons whom he felt they would most benefit; the remainder of the printing of 500 copies is available from Dr. LaRocque at nominal cost.

* * *

Following luncheon the annual business meeting was called to order by President Mead.

He announced that since the Minutes of the previous business meeting were printed in the 1962 bulletin they would not be repeated. It was moved, seconded and carried that these Minutes be approved as printed.

President Mead said that since the office of Treasurer had been active for less than one year (funds and records had been turned over to Treasurer Jean Cate on October first and the fiscal year now begins on January first) it would be premature and confusing to hear a report of that office for the incomplete period. However, a complete accounting had been made to the Executive Council and will appear in the 1963 Annual Report Bulletin.

The annual report of the Secretary was requested; it also had been furnished earlier to the Executive Council.

REPORT OF THE SECRETARY, June 1, 1962-June 1, 1963

Although the new office of Treasurer was created and Jean M. Cate elected to fill it in July (1962), it was October first before it was possible to complete the transfer of records and duties. Since that date a monthly remittance of all receipts accruing from sales of "How to Collect Shells," from new mem-

bership dues and occasional other sources of revenue has been made to the treasurer. Relief from the former dual duties has been immense and a very good rapport exists between the two offices.

In the past twelve months 96 new members have been enrolled, 4 lost by death (Ruth Cahoon, Mrs. Fred St. John Hoffman, A. S. Koto, Mrs. Rodney Proctor), 8 resigned and 48 dropped for delinquent dues. The present membership of 793 is divided thus: 554 regular members, 16 paid life members, 5 honorary life members, one honorary life president; 194 hold combination or family memberships, there are 23 foreign or corresponding members—4 of these hold combination memberships.

Inquiries concerning AMU membership and shells in general have greatly increased, due in part to mention of the Union in two or three recent and popular publications. Since it has become impossible to draft a personal reply to every letter, in most instances acknowledgment is made by a packet of mimeographed material including AMU membership information, brief description of "How to Collect Shells," list of local clubs, of shell dealers, of molluscan literature, such publisher's advertisements as may be at hand and always a copy of Shell Oil Company's little booklet entitled "Let's Collect Shells!" Any material which is in any way informative and will serve as stuffers will be gratefully received.

Our own publication "How to Collect Shells" continues to sell at a steady rate. In the past year 149 copies were sold for \$290.24 while expenditures for stamps and notices totaled \$23.40. The net profit to date for both editions totals \$207.24 and 368 copies remain to be sold. The type which was purchased in 1961 is being held by the printer in Buffalo; his recent estimate to print 1,000 copies was \$907.00. The matter of reprinting was discussed at the Executive Council meeting.

750 copies of the 1962 annual report were printed at a per-copy cost of \$1.03. A recent count has shown that some of the bulletins of former years are out of print and that those available are in more or less short supply.

It was moved, seconded and carried that this report be approved as read.

* * *

At the suggestion of President Mead a brief report of action taken by the Executive Council at the earlier meeting of that body was made by the Secretary.

1963 MEETING OF THE EXECUTIVE COUNCIL

The matter of incorporation of the AMU as a scientific, non-profit organization, tabled in 1962, was reintroduced. After discussion it was decided to incorporate and a committee was appointed to take preliminary steps necessary for such action.

Announcement was made that greetings had been sent on behalf of the American Malacological Union to the Malacological Society of Japan on occasion of the 35th anniversary of that body.

The invitation of Dr. Dee Dundee to hold the 1964 annual meeting in New Orleans was accepted.

The report of the nominating committee was heard and the Council went on record as giving unanimous approval to the slate as read.

Time had not permitted close examination of the preliminary draft of the

proposed revision of the AMU Constitution, but each member of the Executive Council was requested to furnish the committee with such suggestions as he or she felt were necessary to draft as complete and satisfactory a document as possible for ratification by the membership-at-large.

* * *

President Mead suggested that endorsement by the membership of the announced plan to incorporate would be desirable; it was moved, seconded and carried that the members present at the business meeting go on record as signifying approval of this step.

Chairman of the nominating committee Henry van der Schalie read the following slate of nominated officers:

President, John Q. Burch; Vice-president, Juan José Parodiz; 2nd Vice-president, Myra Keen; Secretary, Margaret C. Teskey; Treasurer, Jean M. Cate; Publications Editor, Morris K. Jacobson; Councillors-at-Large, Wendell O. Gregg, Arthur S. Merrill, Dorothy Raeihle, Ernest J. Roscoe.

It was moved, seconded and carried that the secretary be instructed to cast a ballot for unanimous election of the slate as read.

Publications Editor Morris K. Jacobson announced that former restriction to 300 words for abstracts of papers read at AMU and AMU-PD annual meetings will be enlarged to 500 words until further notice.

Pacific Division Chairman Crawford N. Cate extended the greetings of his Division to fellow AMU members, invited all to attend the Pacific Division annual meetings and reminded those responsible for determining dates of annual meetings of the desirability of staggering dates to enable as many as possible to attend both meetings.

Dr. R. Tucker Abbott reported that his project of compiling a suggested set of rules for the conducting of shell shows was nearly completed and that copies will be available upon request.

* * *

The business meeting was adjourned at this point and following a brief intermission the final academic session of the meeting was under way.

Dr. Arthur H. Clarke, Jr. requested permission to introduce Miss Maryl Weatherburn, a high school student from Ottawa, Canada whom he feels has a promising future in the field of natural sciences.

Miss Weatherburn related how her two projects had won awards at the annual Science Fair of Ottawa, Canada and the Canada-Wide Science fair at Toronto. The 1962 project had been a study of molluscan adaptation of intertidal regions of the Atlantic Boreal Zone, that of the current year recorded a collection of Ottawa River molluscs tied in with a survey of pH and bacterial pollution along an eighty mile stretch of the river.

Her listeners gave a sincere ovation to the modest young lady. Dr. Clarke is to be commended for the encouragement and aid which he generously extends to the students of his area.

The remainder of the afternoon was devoted to a colloquium on THE EXPANDING FRONTIERS IN MALACOLOGY. Unfortunately the time allotted was all too short and the final two papers were condensed to the briefest of outlines.

NEW MARINE FRONTIERS. Arthur H. Clarke, Jr., National Museums of Canada, Ottawa, Canada.

NEW FRESHWATER FRONTIERS. Emile A. Malek, Tulane University, New Orleans.

NEW TROPICAL FRONTIERS. William J. Clench, Museum of Comparative Zoology, Harvard University.

NEW DESERT FRONTIERS. Albert R. Mead, University of Arizona.

NEW FRONTIERS IN TAXONOMIC CRITERIA. John B. Burch, University of Michigan.

* * *

At the close of the final paper there ensued the usual mad scramble to don party clothes and to board the bus for transportation to the Museum—the occasion, the annual dinner.

Upon entering the spacious Central Hall it was quite evident that the staff together with members of the Conchological Section had been busy throughout the day. Two flowing fountains dispensing cooling punch and flanked by laden trays of hors d'oeuvres were patronized with alacrity. Most appreciated, however, was an opportunity to spend a pleasant hour in relaxing conversation with friends seen all too seldom in the busy days just past.

The thoughtful hosts had provided as souvenirs booklets describing and picturing the exhibits and activities of the Buffalo Museum of Science. Perhaps even more appreciated was a printed listing of all of the delegates together with their home addresses, this a feature that it may be well to copy in the future.

Members of the Conchological Section had made most attractive name cards decorated with arrangements of local shells; as has been the custom in recent years guests were instructed to use these in forming congenial groupings at the several long tables arranged across the rear of the hall. Here conversation continued until interrupted by summons to a delicious dinner.

Coffee over, President Mead rapped for attention, then called the roll of the thirty-one shell clubs affiliated with the AMU. He asked that members stand as their club was called. The local club was, understandably, best represented with the New York Shell Club a close second. The Canadians present comprised a sizable group; eleven past-presidents of the AMU responded to instructions to stand and be recognized.

At last, but far from least of the groups to be called, the Conchological Section, Buffalo Museum of Natural Sciences rose to receive prolonged and sincere applause by their appreciative guests.

As his next-to-final official act President Mead introduced President-Elect John Q. Burch. Mr. Burch thanked his fellow members for having elected him, then invited everybody to attend the meeting in New Orleans; "It can't be any better than this one has been, but we'll do our best to match it!"

The banquet hall was cleared, then, and everyone asked to reassemble for the final time in the familiar auditorium. Here as featured speaker Dr. Albert R. Mead shed his presidential gravity and emerged as a really funny man—with a message; his theme, **THE LIGHTER SIDE OF SCIENTIFIC ENDEAVOR**. For nearly an hour he convulsed his audience with rapid fire witty satire; although he ended on a sober note it was for delightful comedy that AMU members will long remember a truly different presidential address.

* * *

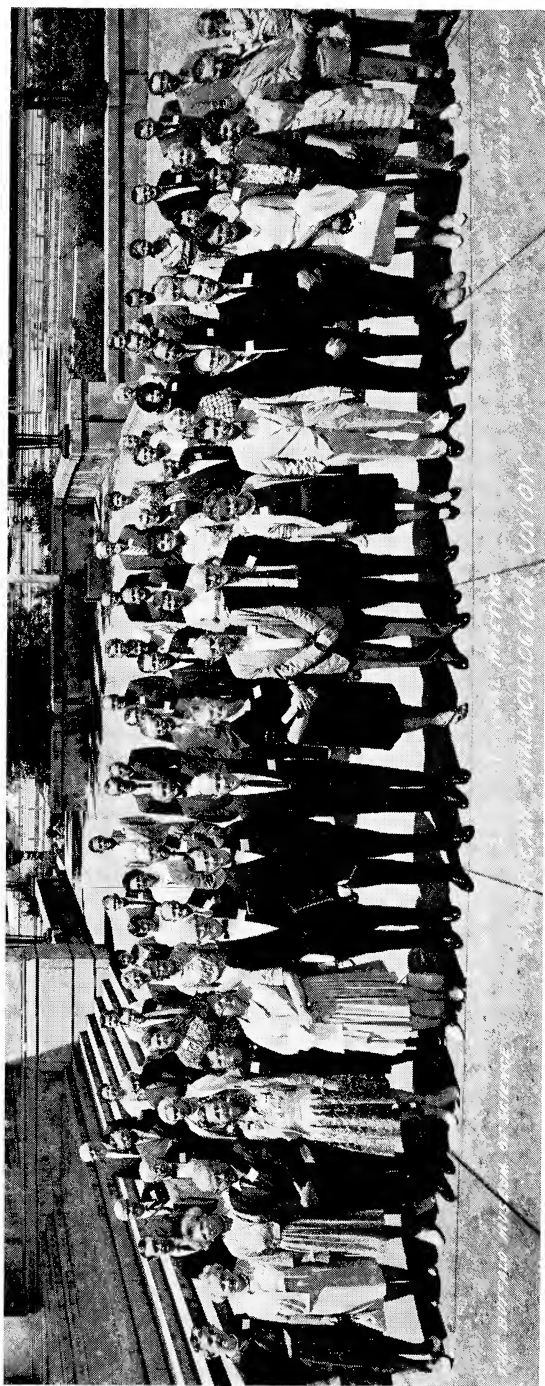
Friday morning dawned cloudy and cold. However, by noon June weather had asserted itself and the large number of those taking advantage of the

opportunity to tour Niagara Falls shed coats and then sweaters as the day wore along.

It was a delightful excursion made in the bus which had become so familiar. There were stops to view the cataract above the Falls, a noon meal in the new Seagrim's Tower which afforded a breathtaking vista of both the Canadian and American Falls, then a drive along the river with stops at such vantage points as the Whirlpool, Niagara Glen with its fascinating geologic past and the famed floral clock. It was late afternoon before the entourage returned to the Hotel, made later still by the fact that the bus driver had become lost and in seeking reorientation had treated his passengers to a ride through a large portion of the Niagara Frontier.

The exodus made that night and the following morning can not have had a noticeable effect on the economy of a great city, but in the hearts of friends who parted for another year it was "sweet sorrow." The 1963 meeting was at an end.

MARGARET C. TESKEY



FIRST ROW, LEFT TO RIGHT: Ellen Holdway, Norma Ashbery, Louise Becker, Dr. Rudolf Stohler, Enid P. Donahue, Bernice Plummer, Jean M. Cate, Crawford N. Cate, Dr. William Emerson, Dr. Albert Mead, Margaret C. Teskey, Dr. William Clench, John Q. Burch, Dr. Ruth Turner, Dr. R. Tucker Abbott, Henry S. Gordon, John McCallum, Gladys McCallum, Bonnie McCallum, Mrs. Henry Coomans, Dr. Henry Coomans and Cynthia.

SECOND ROW: Edward F. Cowles, Jr., Dr. Fritz Haas, Josephine Berry, Mrs. William Hamilton, Maryl Weatherburn, Dr. Juan J. Parodiz, Dr. Arthur H. Clarke, Jr., Morris K. Jacobson, Dr. Aurele LaRoque, Dr. Joseph Rosewater, Mrs. Joseph Rosewater, Diana Wandyez, Reverend H. B. Herrington, Mrs. H. B. Herrington, Eugene Musial, Mrs. A. Leslie Potter, Mrs. Paul Peters, Mrs. Morley Bishop, Robert Wakefield.

THIRD ROW: Dr. E. Laurence Palmer, Dr. Elmer Berry, Jay A. Weber, Dr. Bruce McCraw, Dr. Henry van der Schalie, Dr. Dee Dundee, Dr. Dortheca Franzen, Joseph Schweitering, Edward C. Roy, Jr., Virginia Orr, Dr. Emile A. Malek, Alice Gary, Juliette Comitello, Charlotte Patterson, Dr. John B. Burch, Dr. Robert Robertson, Mrs. Robert Robertson, Dr. Harold Walters, Clifford J. Awald.

BACK ROW: Fred T. Hall, Dorothy Raehle, Inez Gruetzmacher, T. Edward Watkins, Richard Foster, Eugene Schmeck, Dr. Joseph P. E. Morrison, Ruth E. Ostheimer, Dr. Alan Solem, G. N. Usticke, Marian Schroth, Katherine Anderson, Dr. Katherine V. W. Palmer, unidentified.

ATTENDED THE 1963 ANNUAL MEETING

Dr. R. Tucker Abbott, Philadelphia
Katherine Anderson, Chillicothe, Ohio
Robert F. Andrie, Buffalo, New York
Mrs. Eliot Armstrong, Buffalo, New York
Norma L. Ashbery, Buffalo, New York
Clifford J. Awald, Kenmore, New York
Dr. Harold H. Axtell, Buffalo, New York
Mrs. Stanley Bearss, Buffalo, New York
Dr. and Mrs. Elmer G. Berry, Bethesda, Maryland
Louise W. Becker, Buffalo, New York
David M. Bigelow, Buffalo, New York
Mr. and Mrs. Morley J. Bishop, Akron, New York
Dr. John Bayard Burch, Ann Arbor, Michigan
John Q. Burch, Los Angeles, California
Mr. and Mrs. Crawford N. Cate, Los Angeles, California
Dr. Arthur H. Clarke, Jr., Ottawa, Canada
Dr. William J. Clench, Cambridge, Massachusetts
Juliette Compitello, Brooklyn, New York
Dr. and Mrs. Henry E. Coomans, New York City
Edward F. Cowles, Jr., New Rochelle, New York
Mrs. Enid P. Donehue, Sanibel, Florida
Dr. Dolores S. Dundee, New Orleans, Louisiana
Enid Eckbery, Buffalo, New York
Dr. William K. Emerson, New York City
Richard W. Foster, Wayland, Massachusetts
Dr. Dortha Franzen, Bloomington, Illinois
Alice M. Gary, Buffalo, New York
Henry S. Gordon, New York City
Inez Gruetzmacher, Menominee, Michigan
Fred T. Hall, Buffalo, New York
Mrs. William J. Hamilton, Ithaca, New York
Dr. Fritz Haas, Chicago
Norwood C. Hazard, Buffalo, New York
Rev. and Mrs. H. B. Herrington, Westbrook, Ontario, Canada
Ellen Holdway, Buffalo, New York
Mr. and Mrs. Damon A. Holmes, Buffalo, New York
Anne Hunter, Hackensack, New Jersey
Morris Karl Jacobson, Far Rockaway, New York
Dr. Aurele LaRocque, Columbus, Ohio
Kay Lawrence, Falmouth, Massachusetts
Dr. Emile A. Malek, New Orleans, Louisiana
Mr. and Mrs. John McCallum and Bonnie, Wexford, Pennsylvania
Andrew McClary, Milwaukee, Wisconsin
Dr. Bruce M. McCraw, Guelph, Ontario, Canada
Dr. Albert R. Mead, Tucson, Arizona
Dr. Joseph P. E. Morrison, Falls Church, Virginia
Alice Metz Morrow, Clarence, New York
Eugene Musial, Tonawanda, New York

Virginia Orr, Philadelphia
Ruth E. M. Ostheimer, Philadelphia
Dr. E. Laurence and Dr. Katherine V. W. Palmer, Ithaca, New York
Dr. Juan J. Parodiz, Pittsburgh, Pennsylvania
Charlotte M. Patterson, Ann Arbor, Michigan
Mr. and Mrs. Paul E. Peters, Kenmore, New York
Bernice Plummer, Rochester, New York
Mrs. A. Leslie Potter, Williamsville, New York
Mr. and Mrs. John M. Prophet, Jr., Buffalo, New York
Mrs. George Raeihle, Elmhurst, New York
Pamela J. Riley, Buffalo, New York
Dr. and Mrs. Robert Robertson, Philadelphia
Dr. and Mrs. Joseph Rosewater, Washington, D.C.
Edward C. Roy, Jr., Columbus, Ohio
Jean Russell, Buffalo, New York
Dr. Rudolf Stohler, Berkeley, California
Marian M. Schroth, Woodhaven, New York
Eugene H. Schmeck, Niagara Falls, New York
Joseph F. Schwietering, Columbus, Ohio
Dr. Alan Solem, Chicago
Dr. David H. Stansbery, Columbus, Ohio
Carol B. Stein, Columbus, Ohio
Margaret M. Teare, Buffalo, New York
Margaret C. Teskey, Marinette, Wisconsin
Dr. Ruth D. Turner, Cambridge, Massachusetts
Gordon Newell Usticke, St. Croix, Virgin Islands
Anette S. Vallone, South Wales, New York
Dr. Henry van der Schalie, Ann Arbor, Michigan
Robert H. Wakefield, Ann Arbor, Michigan
Dr. Harold J. Walter, Ann Arbor, Michigan
Mrs. Joseph Wandyez, Clarence, New York
T. Edward Watkins, Riviera Beach, Florida
Maryl Weatherburn, Ottawa, Canada
Jay A. Weber, Miami, Florida

ATTENDED THE 1963 PACIFIC DIVISION MEETING

Mrs. Edith Abbott, San Dimas, California
Mrs. Robert Alexander, La Mesa, California
Mr. and Mrs. Edwin C. Allison, La Jolla, California
Mrs. Fern Anderson, Bell, California
Mrs. Gladys Archerd, Berkeley, California
Nelson Baker, Santa Barbara, California
Mrs. R. G. Beck, Santa Barbara, California
Mr. and Mrs. Fred Berg, Santa Barbara, California
Eugene Bergeron, Panama
Priscilla Blesch, Burlingame, California
Mr. and Mrs. Ford Bratcher, Hollywood, California
Mrs. Helen Breymann, Burlingame, California
Mrs. Dorothy Brown, Los Angeles, California
Mr. and Mrs. John Q. Burch, Los Angeles, California
Helen and Alice Burton, Oakland, California
Mr. and Mrs. Crawford N. Cate, Los Angeles, California
Mr. and Mrs. Emery P. Chace, San Diego, California
Eugene Coan, Palo Alto, California
Mrs. Martha Dippell, Los Angeles, California
Mr. and Mrs. Joseph DuShane, Altadena, California
Renee DuShane, Altadena, California
John E. Fitch, San Pedro, California
Effie Forthune, Seattle, Washington
Mr. and Mrs. Mead French, Lomita, California
Wendell O. Gregg, M.D., Los Angeles, California
Mrs. Lela Griffith, Egmont, British Columbia, Canada
Miss Phoebe Gunn, Santa Barbara, California
Mr. and Mrs. Edgar J. Hailey, Oxnard, California
Mr. and Mrs. Denzil I. Hartley, Melbourne, Victoria, Australia
Mrs. Faye Howard, Santa Barbara, California
Mrs. Eleanor and Miss Camilla Ingram, La Crescenta, California
Mrs. Marilyn Johnston, Portland, Oregon
George P. Kanakoff, Los Angeles, California
Dr. A. Myra Keen, Stanford, California
Dr. Homer P. King, Los Angeles, California
Patrick I. LaFollette, Huntington Park, California
Mr. and Mrs. Douglas Larson, Concord, California
Miss Mary E. Long, Sonora, California
Dr. and Mrs. Victor Loosanoff, Tiburon, California
James McLean, Stanford, California
Dr. Albert R. Mead, Tucson, Arizona
Walter B. Miller, Malibu, California
Estella Mulvania, Pensacola, Florida
Prof. Jens M. Ostergaard, Mountain View, California
Mr. and Mrs. Ted Phillips, Santa Barbara, California
Dr. Ross H. Pohlo, La Jolla, California
Mr. Robert and Peter Profant, Santa Barbara, California
Miss Elaine Reeves, Stanford, California

Mae Dean Richart, San Francisco, California
 Capt. R. D. Risser, USN, Monterey, California
 Frank D. Russ, Alameda, California
 Dr. Helen Shimota, Tacoma, Washington
 Misses Charlotte and Katherine Shuman, Seal Beach, California
 Mrs. Georgia Smith, Santa Barbara, California
 Mr. and Mrs. V. D. P. Spicer, Centralia, Washington
 Gale Sphon, Santa Barbara, California
 Dr. Rudolf Stohler, Berkeley, California
 Ray H. Summers, Petaluma, California
 Robert Talmadge, Sr., Willow Creek, California
 Mr. and Mrs. Donald Tarling, Cathedral City, California
 Mrs. Polly Thomas, Santa Barbara, California
 Mrs. Ida E. Thompson, Laguna Beach, California
 Mrs. Inez Wardle, Los Angeles, California
 Mrs. Jean Wilkins, Downey, California
 Miss Ruth Winchell, Portland, Oregon
 Mrs. Fay Wolfson, San Diego, California

THE AWARD OF HONOR OF THE PACIFIC DIVISION

This is the second of a series of occasional awards with which the Pacific Division proposes to honor those who have contributed in an outstanding way to malacology. This year the recipient was Dr. Myra Keen of Stanford University, whose many contributions to science speak for themselves. The species illustrated (except the *Berthelinia chloris belvederica* Keen and Smith 1961 in the upper right) are some of the many named in honor of Dr. Keen. They are, reading downward and across: *Ocenebra keenae* Bormann 1946, *Trivia myrae* Campbell 1961, *Rissoina keenae* Smith and Gordon 1948, *Alvania keenae* Gordon 1939, *Periploma keenae* Rogers 1962, *Teinostoma myrae* Pilsbry and Olsson 1952, *Nomaeopelta myrae* Berry 1959, *Chattonia trigonata keeni* Chavan 1939, *Venericardia keenae* Verastegui 1953, *Bornia keenae* Marks 1951, and *Ensis myrae* Berry 1953.

The first Award of Honor was made in 1960, to Mr. and Mrs. E. P. Chace (see AMU Annual Reports for 1960, p. 49). Both certificates were designed and completed by Mr. Perfecto Mary of the Department of Geology at Stanford University.

To



A. Myra Keen



in recognition of her outstanding contributions to malacology, her continuing inspiration to students and her unfailing interest in the amateur collector.

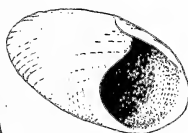


AMERICAN MALACOLOGICAL UNION

PACIFIC DIVISION

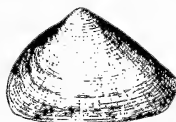
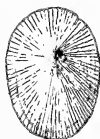
GOLETA, CALIFORNIA

June 1963



Crawford A. Latta
Chairman

Ruth C. French
Secretary





AMU, PACIFIC DIVISION

1963 ANNUAL MEETING

FIRST ROW, LEFT TO RIGHT: E. P. Chace, Fay Wolfson, Rudolf Stohler, Elsie Chace, Ruth French, John Q. Burch, Jean Cate, Crawford Cate, Georgia Smith, Lela Griffith, Faye Howard, Estella Mulvania, Effie Forthun, Martha Dippell, Eleanor Ingram.

SECOND ROW: Dorothy Brown, Ida Thompson, Fern Anderson, Robert Talmadge, Denzil Hartley, Thelma Hartley, George Kanakoff, Mae Dean Richart, Amzel Spicer, Mary Long, Twila Bratcher, Inez Wardle.

THIRD ROW: V. D. P. Spicer, Eugene Bergeron, Gladys Archerd, Jens Ostergaard, Ray Summers, Edgar Hailey, Gladys Hailey, Jean Wilkins, Ruby Berg, Charlotte Gunn, Phoebe Gunn, Polly Thomas, Mary Larson, Mead French.

FOURTH ROW: Joe DuShane, Walter Miller, Wendell O. Gregg, Katherine Shuman, Ross Pohlo, Helen Breymann, Tamara Loosanoff, Betty Phillips, Ted Phillips, Ford Bratcher, Douglas Larson, Ruth Tarling, Donald Tarling.

BACK ROW: Homer King, Frederick Berg, Dr. Victor Loosanoff, Priscilla Blesch, Eleanor Allison, Ned Allison, R. D. Risser, Eugene Coan, Dr. Albert Mead, James McLean.

16TH ANNUAL MEETING OF A.M.U., PACIFIC DIVISION

Registration started Wednesday, A.M., June 26, 1963, with visiting in the lounge of Santa Rosa Hall as friends met again. Mrs. Faye Howard provided a packet of shells for each registrant.

Formal meetings started at 1:30 P.M. with Chairman Crawford N. Cate welcoming us all.

Our first paper was an excellent report by Eugene Coan on "Mollusca of Santa Barbara County."

(Abstract)

During the past year, an attempt was made to survey the mollusks of Santa Barbara County. The last major survey of this area was that of Yates in 1890. Santa Barbara County has a 100-mile-long coastline, nearly evenly divided between the faunas typical of southern and of northern California; the division points are Point Conception and Point Arguello. A collection has been made on the north side of Point Conception to help confirm uncertain northern and southern range limits. Because of the inaccessibility, due to military bases, of the points and beaches in the northern half of the county most attention has been given to the southern portion.

Yearly sand movement on the coast prevents numerous species from establishing themselves on many rubble beaches. Certain beach areas are covered with sticky tar from offshore seeps. There is an interesting fossil tar seep on the beach just south of the University of California, Santa Barbara, which contains deep-water fossils.

There is a considerable problem in the UCSB area from the mixing of Recent beach material with material from nearby Pliocene and Pleistocene deposits, from the sub-fossil Goleta Lagoon, and from Indian kitchen middens. However, with care, many new records have been obtained from beach material.

The probable holotype of *Ventriocolaria fordii* (Yates, 1890), a species described from Santa Barbara County, has been located in the Santa Barbara Museum of Natural History.

Acmaea fenestrata, *Mopalia porifera*, and *Mopalia acuta* are typical of the rubble areas which break the long expanses of sand beach. Nearly all of the Pholadidae and associated nestlers may be found in the intertidal and subtidal shale reefs, including *Penitella gabbi*.

Diving is made difficult by poor visibility along coastal beaches; however, it is good off the channel islands. Typical forms of the twenty to thirty foot deep kelp holdfast are *Mitra idae*, *Zonaria*, *Astraea undosa*, *Megathura*, *Maxwellia*, and *Jaton*. *Kelletia*, *Olivella* (2 spp.), *Nassarius* (2 spp.), and *Acteon* are encountered on the sand bottom in shallow water. Rare species collected in rubble from thirty feet of water include *Acmaea rosacea*, *Calliostoma splendens*, *Lamellaria orbiculata*, and *Volvulella cylindrica*.

In general, Santa Barbara populations are small, but the variety is great. *Zonaria* and *Kelletia*, both of which are present in large numbers during most of the year, are important exceptions. Careful collecting along the entire county coastline would prove Santa Barbara County to have an unusually large molluscan fauna.

Then Dr. A. Myra Keen gave her paper on "Paleontological Hoaxes." This was illustrated with slides.

(Abstract)

Malacology seems not to have provided sufficient grounds for deceptions of international renown, for most of the ones attempted are a minor sort, such as counterfeiting of valuable shells or concealment of stolen specimens by ingenious means. In paleontology, however, at least three are of enough note to be mentioned in textbooks. Two involve human remains—the Calaveras skull, at first reported as occurring in pre-Pleistocene sediments in California, and the supposedly Pleistocene Piltdown man and his artifacts, in England. We do know that both were deliberately faked or planted. The third hoax has long been known as the *Lithographiae Wirceburgensis* of Dr. Johann Beringer.

Dr. Beringer's story has been told, with varied embellishments—basically that his students had faked fossils of many kinds to see just what he would believe. A recently published book by Jahn and Woolf entitled "The Lying Stones of Dr. Beringer" (University of California Press: 1963) reveals documentary evidence to show that instead Dr. Beringer was the victim of a plot motivated by professional jealousy. He merely put on record the material he had found but was far from being the naive schoolmaster of the conventional tale. The elaborateness of the deception in some ways surpasses that of the Piltdown man fiasco, and some elements of mystery still remain unresolved in both cases.

Dr. Helen Shimota read a "Code of Ethics for Shell Collectors," which was worked out by the Pacific Northwest Shell Club.

(Abstract)

Within the past months the Pacific Northwest Shell Club has developed and adopted a Shell Collector's Code of Ethics.* This Code of Ethics will be sent to schools and science teachers, to shell clubs, to coastal area parks, etc., in an attempt to make people more aware of the need for good conservation practices.

The authors maintain, however, that shell collectors alone are not responsible for the extinction of the various species. Water pollution, land development, and the generally increased human population are more important factors. As a result certain questions need be answered by the professional biologist: questions about water pollution, its effects, prevention, and cure; about the breeding habits and life-spans of various species; and, about the precariousness of the balance of nature within any area.

Next was the movie on "Japanese Pearl Culture," with comments by Dr. Keen.

(Abstract)

During the occupation period after the last war, Professor Hubert Schenck sent back from Japan several reels of film that show the complexities of

* Copies may be obtained from Tom Rice, Route 2, Box 483, Poulsbo, Washington.

Note: Dr. Keen first presented this film in 1949 (see A.M.U. Annual Reports for 1949, p. 21) but has repeated it at this time because many newcomers to the organization had not seen it.

pearl culture. Japanese aquatic biologists have, in a sense, domesticated one of the several mollusks capable of producing marketable pearls and have perfected techniques for rearing the oysters and inducing pearl growth by surgical means so that pearls of uniform size and quality can be harvested in quantity—pearls grown, one might say, to order. The entire process, however, from the time of spawning of the oyster to the final harvesting requires six to seven years and much equipment, representing a considerable investment on the part of the pearl farmer in terms both of labor and of materials. Although culture pearls can be produced more cheaply than the so-called “natural” one (the difference between the two is so very slight that even experts cannot always distinguish them), the price must remain substantially higher than that of artificial pearls, which are glass beads coated with a lustrous substance made from fish scales.

After dinner the Santa Barbara Malacological Society hosted a very nice reception. The highlight of the evening was the presentation of the Award of Honor to Dr. A. Myra Keen in recognition of her work in malacology and her patience with and interest in other students and their problems.

Later the Santa Barbara ladies, led by Mrs. Hailey and Mrs. Phillips, served punch, coffee, and delicious cookies.

Cliff Weaver's display of volutes and Twila Bratcher's *Conus* were the focus of attention much of the evening. Visiting went on 'til a late hour. Eugene Coan did a splendid job of arranging for exhibits this year with the land shells, Vermetidae, and the Santa Barbara County Mollusca.

Thursday A.M. started with Edwin Allison's talk “The History of the Gulf of California.” Mr. Allison had driven up from San Diego that morning, so he was really an early riser, to give us an interesting talk.

(Abstract)

Geographical mapping in Baja California is progressing more rapidly than was anticipated. Published results of this summer's work should include an area from San Diego and Imperial counties southward to a line at least 100 miles south of the U.S.—Mexico boundary.

The Gulf of California occupies a segment of the North American cordillera which at present is characterized by a north-northwestern orientation of major mountain ranges, intervening depressions, and coastlines. A limited knowledge of rocks within the Gulf of California trough requires that its origin and history be interpreted indirectly from the geology of adjacent and apparently related cordilleran areas. Its demonstrable history begins with the Pliocene Epoch, through Miocene fossils of southeastern Baja California, and Eocene fossils northeast of the Salton Sea suggest a possibility of an origin preceding the deposition of those earlier evidences of marine deposition in the Gulf of California trough.

A major geological event which may have established the modern peninsula of Baja California, and thus the Gulf of California, was the late Mesozoic orogeny which culminated with the emplacement of great masses of granitic rocks along the western continental margin. These granitic rocks presently form the axis of Baja California. Older patterns of trans-tropical distributions of many mollusks and other marine invertebrates were disrupted at that time. Older structural features were altered and obscured. An essentially

modern coastline was developed along parts of western Baja California by the end of the Mesozoic Era.

Several hypotheses for the structural origin of the Gulf of California must be considered with the scarcely restricting available geological information. The once widely accepted explanation of subsidence of an elongate strip of the continental margin is no longer tenable. A acceptable explanation may include either or both of the following processes: (a) emergence of Baja California as a strip of land separated by a trough (the Gulf of California) from the previous western continental margin, (b) lateral or cross displacement of a segment of the continental border, leaving an intervening gap.

Thursday features San Diego speakers. Mrs. Fay Wolfson and her husband have a "Do-it-yourself Tidepool" and she told us of their successes, illustrated with her husband's slides.

(Abstract)

Although the behavior of animals in captivity is not acceptable proof of their natural behavior, much interesting and valuable information can be obtained by bringing them into the home. Slides illustrating a few of the possible observations included pictures of a number of species of gastropods, showing soft parts, mantle, mouthparts in the act of feeding, and egg capsules.

John Q. Burch shared his work on the *Agaronia*, with slides to illustrate some points.

Then Mrs. Denzil I. Hartley shared her very lovely slides showing Australia's coastline and some of the local treasures among the mollusks. She is a delightful speaker and it was a most interesting hour.

(Abstract)

Australia—the largest island in the world—has an area of 2,971,081 square miles (almost equal to that of the United States and $\frac{4}{5}$ that of Canada), and its coastline is 12,210 miles long. Off this coast there are huge faunal areas of rich material which fall into six distinct provinces, each with its own representative species. The geographical coverage of these areas is outlined; selected collecting places and species relevant to each are discussed and illustrated by color transparencies; also a 16-mm. movie film of the Great Barrier Reef which is the largest coral reef in the world, completes the talk.

After lunch we met at the University Music Bowl for the Group Picture. Then, back to the auditorium for Dr. Albert Mead's lecture on "Disease, Decline and Predation in the Giant Snail Populations of Hawaii." Illustrated. (Abstract appears on page 22.)

Dr. Victor Loosanoff's paper on "Rearing of Larvae of Certain Mollusks" was most scholarly and was much enjoyed by our scientific members—with slides to make some of his points clearer to the audience.

(Abstract)

By using the new methods recently developed at U.S. Bureau of Commercial Fisheries Laboratory at Milford, Connecticut, many mollusks, especially bivalves and gastropods, can be conditioned to develop their gonads to a state of ripeness and be induced to spawn throughout, or almost throughout, the

year. Methods employed in conditioning and spawning are discussed in the paper. Dependable Milford methods for production of certain species of algae in unialgal and bacteria-free cultures assure a good supply of live foods for larvae of many mollusks, as well as larvae of other phyla. Dried algae such as *Ulva* and especially unicellular ones as *Scenedesmus*, and freeze-dried naked flagellates, such as *Isochrysis galbana*, and *Monochrysis lutheri*, were also found to be excellent food for larvae of certain species, for example, *Mercenaria mercenaria*; although larvae of some other species, such as *Crassostrea virginica*, were not able to utilize them. To control pathogenic bacteria responsible for mortality of larvae during the time when they are cultured to metamorphosis and also to prevent diseases in juvenile mollusks, antibiotics and certain chemicals are now widely used. Because of the recently acquired ability to grow larvae to metamorphosis, extensive studies can now be conducted on the effects of such environmental factors as light, temperature, salinity, turbidity, pH, quality and quantity of food, inter- and intraspecific competition and water currents on the development of young mollusks. Our ability to control conditions under which the young mollusks can be successfully cultured permits a systematic study of diseases and parasites of larvae and juveniles, and has opened for us the field of study of genetics of bivalves such as oysters and clams which may lead to the development of races of these mollusks that will be able to propagate at lower or higher temperatures, will be resistant to a number of diseases, and display much more rapid rate of growth.

Following dinner, we again met in the lounge at Santa Rosa Hall where Mrs. Hartley showed a movie of the Great Barrier Reef and another film showing some of the beauties natural to Australia. This was followed by showing members' slides of persons known to many of us.

Friday A.M. John Fitch gave us an interesting illustrated talk on "Fish Otoliths and the Plio-Pleistocene."

(Abstract)

Otoliths are major, but almost completely neglected, clues to the identities and taxonomic relationships of living and fossil teleost fishes. They are calcareous bodies, 90 to 95 percent aragonite, roughly 0.5 to 50 mm. long, which are precipitated from the endolymph within the auditory labyrinths of teleosts. Almost invariably three pairs (sagitta, lapillus, asteriscus) occur, but only sagittae are important in paleontology.

Otoliths are the most abundant and widespread of the taxonomically identifiable teleost fish remains in the Californian Recent. The Los Angeles County Museum has on hand a collection containing more than 10,000 sagittae from about 20 different deposits in southern California. Additional fossil material is in various private collections; however, only a few individuals (malacologists, conchologists, etc.) have recognized otoliths for what they are, and fewer still have saved them.

Probably no fossil deposit is without otoliths, and almost all dredge hauls will contain some. Thirty-seven otoliths were found in a half-gallon sample of sand, broken shell, and such, that was scooped off the bottom in 150 feet of water near Long Point, Santa Catalina Island, California. Similar samples taken in Santa Monica Bay, off La Paz, off Mazatlán, and near Guaymas have also yielded otoliths.

Crawford Cate read Professor Dr. Franz A. Schilder's paper "Discontinuous Distribution in Cowries," of much interest to all cowrie collectors.

(Abstract)

Several species of *Cypraea* range uninterruptedly from the east coast of Africa to eastern Polynesia, while other species exist as restricted and isolated races over much of the same oceanic range. Why the range of these latter species is interrupted ecologically, with apparently favorable living conditions, is a problem for further study. One of the most curious zoogeographical facts is the surrounding of a central species by allied species which exist as local races in their own restricted areas. It is suggested that careful research in the real distribution of species will show similar discontinuities in other families of marine Mollusca as well.

"A Study of the Family Acmaeidae of the Oregon Coast" by Miss Ruth Winchell and Mrs. Marilyn Johnston led to a lively discussion.

(Abstract)

This is the first in a series of studies of Mollusca found along the Coast of Oregon. Little has been published in this field and the attempt is being made to study the various forms with special emphasis upon ecology. This first study was made on limpets since the great variation in external appearance indicated a need for additional taxonomic assistance.

Three areas along the Oregon coast which seem to be ideal habitats for limpets were selected, specimens taken and examined. These areas were Newport, Cape Falcon and Cape Arago.

Radular ribbons were removed, slides made and examined. The method was similar to that suggested by Test in her Ph.D. thesis at the University of California, Berkeley, California (1937). The typical limpets used were as follows:

Newport: *Acmaea digitalis*, *A. pelta*, *A. persona*, *A. scutum*

Falcon: *A. digitalis*, *A. pelta*, *A. scutum*, *A. cribraria*

Arago: *A. digitalis*, *A. pelta*, *A. persona*, *A. scutum*.

Significant variations in shell appearance were common but in all cases radulae showed consistent sameness within the species. Studies are at present being made with specimens from less desirable habitats to see whether or not adaptation has caused variation in the radulae. It is also planned to extend the studies to other areas.

After lunch we made a trip to the Marine Biology Laboratory on the campus. Again, Eugene Coan's work showed in the many living specimens on display.

Robert Talmadge made some interesting observations in his "Seasonal Changes in Gastropod Populations," again illustrating his points with slides.

(Abstract)

Over a number of years, while observing and collecting marine gastropods in the vicinity of Trinidad on the extreme northern California coast, it was noted that some species had a more or less consistent number of animals present throughout the year, and inhabited, with few exceptions, the same ecological niche. It was noted that other species fluctuated in the number of

individuals, at times quite drastically, and that there appeared to be a benthic alteration of their ecological niches.

For convenience to collectors, this seasonal fluctuation of species was discussed in a chronological sequence rather than covering the abundance or scarcity of the individual species as such. Only the relatively common species were covered, specimens of which the average collector could obtain without specialized local knowledge and/or equipment.

It was suggested that others investigate collecting areas close to their homes for similar situations, and perhaps, in due time, a better understanding of seasonal peaks and valleys of fluctuating populations may be obtained on a broader basis.

The last paper for this convention was James McLean's "Vancouver Island Expedition," with slides.

(Abstract)

A dredging expedition to the Strait of Georgia and Queen Charlotte Strait area east of Vancouver Island was sponsored by the University of British Columbia, May 16 through 24. Collecting conditions were mentioned and several range extensions for marine mollusks were reported.

* * *

The regular business meeting was called to order at 3:20 P.M. by Chairman Crawford Cate.

Letters to the European Malacological Union and its answer were read by Mr. Cate.

Minutes of the Executive Board meeting read and approved.

Motion made, seconded, and carried that the minutes of last year's meeting be approved as printed in the A.M.U. Bulletin.

Treasurer's report read. Moved, seconded, and carried that it be accepted as read.

The Nominating Committee presented the following slate:

Chairman	Dr. A. Myra Keen
V. Chrmn.	Dr. Edwin Allison
Secretary	Mrs. Lucille Zellers
Treasurer	Mrs. Mae Dean Richart

Signed: Elsie M. Chace, Dr. Rudolf Stohler and John Fitch.

Chairman Cate asked if there were any nominations from the floor.

Dr. Shimota moved that the Secretary be instructed to cast a unanimous ballot for the slate as read. Motion seconded and carried.

Dr. Stohler: "I move that all Honorary Life Members of the American Malacological Union and all honored members of its Pacific Division shall be exempt from the annual assessment for the A.M.U.-P.D. For the purposes of this motion, Honorary Life Membership is as defined in the Constitution of the American Malacological Union; honored members of the Pacific Division are those individuals who have, individually or collectively, received the Award of Honor from the Pacific Division." Motion seconded by Dr. Shimota. After some discussion, the motion carried unanimously.

Dr. Stohler: "I move that the Secretary of the Pacific Division of the American Malacological Union shall be instructed to arrange in her Minutes all motions made at the annual convention of the Pacific Division and con-

cerned only with purely internal matters of the Pacific Division under the heading 'Pertaining to A.M.U.-P.D. Only'; and all motions concerned with matters to be submitted to the Executive Council of the A.M.U. for its action under the heading 'Pertaining to A.M.U. in General.' This arrangement shall be carried out in the final copy of the Minutes, regardless of the order in which the motions were actually made." Seconded by Fay Wolfson. All votes: "Aye."

Mrs. Larson called to our attention the fact that the Secretary hadn't been instructed to write a note of thanks to the Santa Barbara Malacological Society. The Secretary was instructed to do so.

Dr. Mead was asked to comment on the proposed new constitution of A.M.U. "All the National Council members are making suggestions. The new constitution will be in the next A.M.U. Bulletin and all A.M.U. members will be asked to vote on this."

Chairman Cate brought to our attention the fact that we are all A.M.U. members and that we have our own Pacific Division bylaws to guide us.

Mrs. Rose Burch reminded us that Mr. and Mrs. Spicer were charter members of the A.M.U.

Meeting closed at 3:50 P.M. by Chairman Cate.

* * *

We met at the Santa Barbara Inn for a very delicious banquet. The tables were beautifully decorated by Dorothy Brown and Twila Bratcher, who used pink carnations in *Tridacna* shells, and clever, handmade place cards. Later Dr. Rudolf Stohler provided a stimulating and thought-provoking talk, deceptively labeled "Random Thoughts of an Amateur Shell Collector."

(Abstract)

Dr. Rudolf Stohler, in his usual way of combining learning with entertainment, provided a thought-provoking evening with his discussion. Among many other things, he showed that the shell of a mollusk is only one character of an animal, and as such is as variable in many species as other characters studied genetically in non-molluscan forms such as the fruit fly. He emphasized that for a complete understanding of any taxonomic unit, it would be necessary to study the anatomy, physiology, cytology, and embryology among other aspects of each species, and he expressed the hope that the recently developed techniques of rearing mollusks (see report by Dr. Victor Loosanoff, above) may open the door to the solution of one of these problems.

Saturday morning our fossil collectors had a field trip, led by Dr. George Hughes, UCSB Geology Department, to a very rich deposit and then our 1963 convention was over.

The Secretary reports 85 members registered.

Respectfully submitted,
Ruth C. French, Sec'y

THE AMERICAN MALACOLOGICAL UNION

EXECUTIVE COUNCIL

1963-1964



Officers

President JOHN Q. BURCH
Vice-President JUAN J. PARODIZ
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Past Presidents—Permanent Council Members

William J. Clench (1935)	Joseph C. Bequaert (1954)
Joshua L. Baily, Jr. (1937)	Morris K. Jacobson (1955)
Horace B. Baker (1940)	Allyn G. Smith (1956)
Harald A. Rehder (1941)	Ruth D. Turner (1957)
Henry van der Schalie (1946-47)	Aurèle LaRocque (1958)
Myra Keen (1948)	R. Tucker Abbott (1959)
Elmer G. Berry (1949)	Katherine V. W. Palmer (1960)
Fritz Haas (1950)	Thomas E. Pulley (1961)
J. P. E. Morrison (1951)	William K. Emerson (1962)
A. Byron Leonard (1953)	Albert R. Mead (1963)



PACIFIC DIVISION EXECUTIVE BOARD

1963-1964

Chairman A. MYRA KEEN
Vice-Chairman EDWIN C. ALLISON
Secretary LUCILLE ZELLERS
Treasurer MAE DEAN RICHART
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HONORARY LIFE MEMBERS

H. B. Baker	Katherine V. W. Palmer
William J. Clench	Fritz Haas
Joseph C. Bequaert	

HONORARY LIFE PRESIDENT

S. Stillman Berry

AMERICAN MALACOLOGICAL UNION

TREASURER'S INTERIM REPORT TO THE EXECUTIVE COUNCIL

The new Treasurer received the account books, records and funds on October 16, 1962, with a closing statement from the previous Treasurer dated October 1. In order to adjust the accounting to the new fiscal year dates (January 1 to December 31) and start off fiscal 1963 under the new plan, it was necessary to close the books December 31, 1962. The following interim report covers the period from October 1 to December 31.

Closing report from Margaret Teskey, October 1, 1962:

Life Membership Fund	\$ 970.88
Checking account	1,150.08
Cash and stamps on hand (Secretary)	30.14
Total	\$2,151.10

Receipts:

Dues	34.00
Pacific Division Assessment50
Sales, HOW TO COLLECT SHELLS	67.97
Sales, back issues of Annual Reports	9.00
Total	\$ 111.47

Balance Forward		\$2,262.57
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Expenditures:

Letterheads printed, Jacobson & Gate	\$ 55.48
Clasp envelopes printed for Annual Reports	9.00
Inserts printed for HOW TO COLLECT SHELLS	11.50
Stamps (Treasurer)	20.00
Bank endorsement rubber stamp (Treasurer) ..	1.75
Foreign check collection charges36
Petty cash, Secretary (see attached list)	19.65
Total expenditures, Oct. 1 to Dec. 31	\$ 141.94

Balance Forward		\$2,120.63
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Funds on hand at closing, December 31, 1962:

Life Membership Fund	\$ 970.88
Petty cash and stamps on hand (Secretary)	10.49
Checking account	1,139.26
Balance	\$2,120.63

NOTES, NEWS, NOTICES

The thirtieth annual meeting of the American Malacological Union will be held in New Orleans July 21-24, 1963. Dr. Dee Dundee who issued the invitation on behalf of Louisiana State University writes that among a wealth of attractive things to see and do, she is endeavoring to draft as many entertainment features as may be fitted into the four-day schedule. Details, rates and the annual call-for-papers will be mailed to all members early in the spring.

And to forestall mass protest that the twenty-ninth annual meeting was held in 1962, hence that of 1963 was the thirtieth, the editorial staff confesses that an error was made in 1959 when the cover caption of Annual Report Bulletin Number 26 listed the twenty-sixth annual meeting rather than (properly) the twenty-fifth. The error was perpetuated without detection until the current year at which time several alert subscribers noticed and reported it. Historians please note: the 1964 annual meeting of the American Malacological Union will be the thirtieth!

* * *

Since inquiries and orders occasionally arrive for back issues of AMU annual report bulletins, it may be useful to list those no longer available. The following are out-of-print:

1931, 1932, 1934, 1938, 1941, 1951, 1952.

Bulletins may be ordered from the Secretary at \$2.00 for any issue at hand.

* * *

Dr. Albert R. Mead has been appointed to be the official representative of the American Malacological Union to the American Association for the Advancement of Science. He succeeds Dr. Charlotte Dawley who has served in that capacity since 1958.

* * *

The AMU lost another charter member with the death on October 24th of Dr. Ditlev Thaanum. Honolulu's Grand Old Man of Shells was 94.

PACIFIC DIVISION MEETING

The Seventeenth Annual Meeting of the American Malacological Union, Pacific Division, is scheduled to be held at Asilomar, Pacific Grove, California, June 18 to 21, inclusive. Anyone interested in malacology or conchology is welcome to attend. Non-members of AMU who wish to be notified as to accommodations when final arrangements are made may send their names and addresses, together with 50 cents, to the AMU PD treasurer, Miss Mae Dean Richart, 15 Moffitt Street, San Francisco, California, 94112. Asilomar is a conference center especially maintained to provide comfortable facilities to groups, and a variety of accommodations will be available, and western members, especially, are urged to attend.

MYRA KEEN, *Chairman*
American Malacological Union,
Pacific Division

If reprints of the abstracts appearing in these annual bulletins are desired, the author should so indicate by printing, in ink or pencil, the word **REPRINTS** at the top of page one of the submitted abstract. Indicate the number of reprints needed. He will then receive, from the printer, a proof of his paper. A schedule of prices is as follows:

	1-2 pp	4 pp
50 copies	\$3.00	\$5.00
100 copies	\$4.00	\$6.00
Additional 100s	\$1.50	\$2.00

(POSTAGE and INSURANCE EXTRA)

AMERICAN MALACOLOGICAL UNION

MEMBER SHELL CLUBS

SANIBEL-CAPTIVA SHELL CLUB, Willie Elmore Glass, Corresponding Secretary: Organized in March, 1961 with 27 members, we now have 188, of which two-thirds are winter residents or visitors. Meetings are held every month, alternating between the Sanibel and Captiva Community Houses. Programs are arranged for the year by a program chairman. Outstanding speakers are invited and this year have included Mrs. Theophil Kuczynski, Mrs. Henry Nickerson, Lt. Col. Corinne Edwards, Miss Ethel Snyder, and Dr. Katherine Palmer, who also served as judge for the 1963 Sanibel Shell Fair.

Mrs. Henry Nickerson and Mrs. J. C. McCaul attended, as delegates, the 1962 AMU meeting in St. Petersburg. Mary Cunningham prepared two boxes of beautiful specimen shells from Sanibel and Captiva for display in the Lee County Chamber of Commerce's Rolling Showcase. One hundred fifty bags of shells were contributed to that organization for distribution at their Welcome Stations. Distribution of the Club's handbook, "Conservation, Collection, Cleaning," will exceed 15,000 this year. The Club had complete charge of the shell exhibits at the 1963 Sanibel Shell Fair and will accept the same responsibility in 1964. Two "newsy" newsletters have been issued by Mrs. Maude Nickerson; these are of special interest to the away-from-home Island members. Finally, this year's shell count showed 124 species collected, with 22 names added to last year's list.

Officers are: Mrs. Mary Aleck (Sanibel), President; Mrs. Henry Nickerson (Captiva), 1st Vice-President; Mrs. Tom Nix (Sanibel), 2nd Vice-President; Mrs. Carol Lee Gehr (Captiva), Recording Secretary; Mrs. John P. Glass (Sanibel), Corresponding Secretary; Mrs. Paul Kearns (Sanibel), Treasurer.

SOUTH FLORIDA SHELL CLUB, John A. Baker, Secretary: The Club meets at the Museum of Science and Natural History in Miami, Florida, on the fourth Monday of each month (except December) at 8:00 P.M.

We shell most often in Bear Cut, Miami, but members have traveled into the Everglades by swamp buggy for *Liguus*, gone to Peanut Island in Lake

Worth several times, at other times to Marco Island, and to Rabbit Key in Collier County.

Our second annual Shell Show, featuring land, marine, and fossil shells, was held at the Museum in March, 1963. Judges were Dr. Gilbert Voss and Dr. Frederick M. Bayer of the Marine Laboratory of the University of Miami; both are honorary members of our Club.

Officers serving until October, 1963 are: President, Norris McElya, Jr.; Vice-President, William Seiler; Recording Secretary, John A. Baker; Corresponding Secretary, Mrs. Elizabeth DuPuis; Treasurer, Lt. Col. Corinne Edwards; Historian, Mrs. James Ashworth; Co-chairmen of Field Trips, Mrs. Harold Symonds and Mrs. Lawrence Crovo; Show Chairman, Miss Muriel Hunter; Publicity Chairman, Frank Pellicore; Program Chairman, Miss Frances Hutchings; Library Chairman, John A. Baker.

GULF COAST SHELL CLUB, Anna Mae Bishop, Vice-President: Since August, 1962, our Club has grown steadily. Our most important achievement this year was the First Annual Gulf Coast Shell Show held in April.

It was a weekend show and attracted a large crowd; Harry Lea Kingston won Shell-of-the-Show Award with his *Conus mazei*, while William Cupit won the Gulf Coast Shell Club Award. Plans are under way for a bigger and better show for March, 1964; we hope to make residents of the Golden Triangle Area (Beaumont, Port Arthur, Orange) aware of shells and the reward they offer.

Our second achievement has been the publication of a monthly club paper, "Between the Tides." Mrs. J. Brooks Bishop is the Editor, Mrs. Harry Kingston, Assistant Editor. Accounts of monthly meetings, field trips, and other news of importance to our members are published.

Officers for 1963-64: President, Mrs. Harry Kingston; Vice-President, Mrs. J. B. Bishop, Jr.; Secretary-Treasurer, Howard Burris; Historian, Harry Lea Kingston.

PACIFIC SHELL CLUB, Martha Dippell, President: Again, we enjoyed a year of varied programs, beginning with 1962's Basic Orientation Course which was an outstanding success. It comprised short systematic talks by reliable speakers, advising collectors where and how to collect, suitable clothing, equipment, cleaning instruction, how to display, where to trade, lists of clubs, and available literature.

Our young members gave 5-minute talks on the lives of famous scientists, including Linnaeus, Carpenter, Sowerby, Dall, and California's Dr. Myra Keen.

As we listened we joined, in imagination, featured speakers in diving or dredging for rare shells in such happy hunting grounds as Puertocitos; La Paz; Florida; Hawaii; the Philippines; and Kwajalein. An especially enjoyed talk was entitled "The Shell as a Motif in European Art and Architecture"; it was illustrated with slides, shells, and prints of shells—this last donated by a well-known oil company which features the pecten as its trademark. The speaker displayed, as well, an antique ladle discovered in the flea market of Paris, its bowl half of a *Cypraea tigris* and the handle intricately wrought of bone and silver. There were also examples of old scrimshaw and, from Naples, a partially executed cameo on a *Cassis* shell. Another expert collector, in developing "It Could Happen to You," explained the patient tenacity with which an unnamed species is discovered and named.

We meet at the Los Angeles County Museum on the third Sunday of each month at 2:00-4:00 P.M. Our officers are: President, Mrs. M. Cutler Dippell; Vice-President, Rev. Walter Barber; Treasurer, Isaac Cowgill; Recording Secretary, Robert T. Howley; Corresponding Secretary, Mrs. Frank Epstein; Editor, Mrs. John Q. Burch; Sponsor, George P. Kanakoff.

PALM BEACH COUNTY SHELL CLUB, Cynthia H. Plockelman, Corresponding Secretary: This has been an auspicious year, in attendance, new membership, and interesting programming.

Field trips included excursions to Bear Cut (Miami), to our own Peanut Island in Lake Worth, and to Levee 5 in the Everglades, as well as many smaller expeditions.

Two auctions were held during the year, and the Fourth Annual Shell Show was an outstanding success. Judges Frederick Bayer, Donald Moore, and Gilbert Voss presented the Club's "Seafari Award" to Mrs. Martha Nelson for a self-collected, one-locale display, and the annual award of the National Academy of Science to the Neil Helpers for their magnificent fossil collection.

Over the year a wealth of interesting lecturers delivered talks on a wide range of subjects; speakers included Mrs. Elizabeth Phelps, Mr. Jay Jarrett, Dr. F. M. Bayer, Miss Virginia Orr, Mr. John Root, Mrs. Virginia Lee, Mr. Donald Moore, Mr. Dan Steiger, and Dr. Ruth D. Turner.

A highlight was the election of Mrs. Ward Brown, our first Club President, to Honor Roll for her outstanding service to the community, another the participation of several club members in setting up the Treasures of the Sea exhibit at the Junior Museum in West Palm Beach. Our publication, *Seafari*, has a new cover design and a record circulation.

At the annual business meeting in January the following officers were elected: John Root, President; Corriene Edwards, Vice-President; Lily Roberts, Secretary; Robert Canniff, Treasurer; Cynthia Plockelman, Corresponding Secretary.

CONCHOLOGICAL SECTION, BUFFALO SOCIETY OF NATURAL SCIENCES, Eunice A. Potter, Secretary: Our meetings continued without interruption, even from superabundant snowstorms; they began in September with the report of three members who had attended the 1962 AMU meeting in St. Petersburg, Florida. Eugene Schmeck, Mrs. Peter Plummer, and Mrs. A. Leslie Potter returned already eager to greet AMU members at the 1963 meeting scheduled for Buffalo.

Monthly programs have evolved from the rich experiences of our members. The Bishops spent a week on Sanibel Island when the moon was "just right"; they returned with two surprises: Morley's ability as a marine and aerial photographer and Ethel's skill in extracting a cooked mollusk all in one piece from its erstwhile home—her weapon, a common table fork. As entertainment following the annual dinner, Clifford Awald spoke on fluorescence in rocks and minerals. Mrs. Alice Morrow and Mrs. Peter Plummer with a collection of *Murex* and of exotic varieties from the Indo-Pacific took us over far horizons. Eugene Musial presented a fine paper on his specialty, the mussels of Lake Erie, and with Morley Bishop prepared a fine series of slide photographs of the local molluscs. Louise Becker entertained with Kodachrome slides made at Niagara Glen when the Section entertained the AMU in 1955.

Outstanding was the paper of our March speaker, Miss Lenore Kulach; a freshman at the University of Buffalo, she is making a study of Lake Erie plankton, a project begun in high school days when she won three Science Fair awards.

In February we lost the last charter member of our 66-year-old club when death claimed Mrs. Annie Cureton Hoffman.

We have, at present, thirty-one active members. Officers elected in January are: President, Eugene Musial; Vice-President, Mrs. Joseph Wandyez; Secretary, Mrs. A. Leslie Potter; Treasurer, Miss Louise Becker; Librarian, Mrs. Morley Bishop; Assistant Librarian, Mrs. Alice Morrow.

CONNECTICUT VALLEY SHELL CLUB, Helen B. Burt, Secretary: At our annual meeting the following officers were elected for 1963-64: President, Mrs. Nellie A. Dow; Vice-President, Earl H. Reed; Secretary, Mrs. Helen B. Burt; Treasurer, Mrs. Ruth Warren. We meet the second Monday of each month in the Lapidary Room of the Science Museum, Springfield, Massachusetts.

We enjoyed four field trips: two to the homes of members which combined collecting with picnics, one a visit to the Woods Hole laboratory of the U. S. Bureau of Fisheries, and the last our annual trip to the Cape. On this occasion we enjoyed the company of two members of the Palm Beach County Shell Club.

Over the year these illustrated lectures were enjoyed: "Shelling on Sanibel Island and Fort Myers Beach," Mrs. Connie Glassanos; "Seeking the Elusive Mollusk in Trinidad, Tobago, Barbados and Antigua," Henry and Nellie Dow; "Shelling Adventures in Puerto Rico and the Virgin Islands," Austin and Ruth Warren; "Fouling Mollusks and Organisms," Arthur S. Merrill; "Our Happy Venture on Jekyll Island, Georgia," Austin and Ruth Warren.

A rewarding project was that of supplying boxes of shells to the patients at the Shriners' Hospital for Crippled Children. Each child was supplied with a shoe box containing shells, a pad and pencil, and a shell book; members of our club visited the wards, lectured briefly on shells in general, and displayed slides as well as shells from our own collections. Response was heart warming and our visits and gifts of shells are continuing.

Another project was that of displaying shells at the Starrs Library in Longmeadow, Massachusetts; from this we gained two new members.

Some of our members are accumulating slide libraries of living mollusks in color. Discovery of an active colony of *Cepaea nemoralis* at Chatham, Massachusetts furnished colorful models for our photographers. (According to local residents, this colony has been established for at least ten years.)

Other treasures collected by our members over the year were beautiful specimens of *Busyon perversum* at Jekyll Island; hundreds of *Aequipecten irradians* washed up by a storm at Hyannis, Massachusetts; *Conus granulatus*, *C. regius*, and *C. ranunculus* collected at Barbados; and *Voluta musica* (with knobs) together with *Astraea tecta* from Tobago.

Needless to say, we begin another year with great anticipation!

COASTAL BEND SHELL CLUB, Aileen Taft, Secretary: Our group has been busy this year. Classes for schoolchildren were taught at the Corpus Christi Museum during the school year. Programs for winter tourists and retired people were held during the winter and early spring. We prepared and shipped a fairly complete specimen collection of shells of the Texas

coast to our sister city, Yokosuka, Japan. At present club members are preparing 100 boxes of the most common local shells, these to be sold to museums throughout the country.

Officers of the Club for this year are as follows: President, Carl Young; Vice-President, Mrs. A. H. Chaney; Treasurer, Mrs. Fred Jones; Secretary, Mrs. J. Roy Taft. Regular monthly meetings are held each fourth Tuesday evening, 8:00 P.M., at the Corpus Christi Museum.

JACKSONVILLE SHELL CLUB, Mrs. Edwin S. Hicks, Corresponding Secretary: We gained sixteen new members the first month after our first Shell Show. During the year we held eleven open meetings and published eleven issues of the club-sponsored newsletter, the "Shell-O-Gram." Our meetings included the following: Shell Quiz with an experienced panel; talk on dangerous marine life; four color and motion films on sea life; demonstrations by two members on cleaning and storing shells; talk by a language department head of a nearby university; displays of shells and talks on them by six members at different times. Extra activities included a new display of shells for the Florida State Chamber of Commerce Building; gifts of shells to an Orthopedic School, a kindergarten, and the Children's Museum; talks by three members to five youth groups; shell and fossil exhibits by four members in six libraries; and the Scientific Study Group, which was open to all seriously interested members. Our second Shell Show was held July 26-28 at Sellers Auditorium, 515 Lomax Street. The public was very responsive and we proudly admit it was a success. Except for the December meetings, we meet the fourth Thursday of each month at 8 P.M. at the Arlington Federal Savings and Loan Association, 930 University Blvd. President, Mrs. Albert Raven; 1st Vice-President, Mrs. Larry Hedgecoth; 2nd Vice-President, Mr. Robert Melton; Recording Secretary, Mrs. Frank Macedonia; Corresponding Secretary, Mrs. Edwin Hicks; Treasurer, Mrs. Edwin Eubanks; and Editor, Mrs. Edwin Eubanks.

GARDEN STATE SHELL CLUB, Jane Zager, Secretary-Treasurer: Our organizational meeting, with 14 members present, was held in April, 1963 and elected were: Sam Freed, President; Harry G. Lee, Vice-President; Jane Zager, Secretary-Treasurer.

Our four meetings have been "open forum," with members giving accounts of individual shelling experiences, followed by general discussion, particularly of New Jersey Mollusca. An all-day field trip to Montagu, New Jersey produced 26 species of land Mollusca. Our club library already boasts fifteen books and pamphlets, with promise of many fine volumes. Our main objective is study, learning of all aspects of conchology and malacology.

We have great plans for the future, anticipate a good membership and many pleasant hours of "conchologizing." Meetings will be held in members' homes until such time as a suitable club room can be obtained.

THE PHILADELPHIA SHELL CLUB, John D. Parker, Recording Secretary: High points of the Club's eighth year included programs presented by Drs. R. T. Abbott, W. Clench, and H. B. Baker (Life, Work, and Character of *H. A. Pilsbry*); Dr. R. Robertson (Anatomy of *Monoplacophora*); Dr. R. T. Abbott (Type Specimens Photographed in Europe); Virginia Orr and Ruth Ostheimer (Cocos Islands); and C. John Finlay (Collecting in Cuba).

New this year were Volume 1, Number 7, of the *Proceedings*, and a members'

shell exhibit (by members, for members). In addition, there were continuations of the monthly reviews of literature on mollusks; a publications exchange with other clubs; the shell-exchange project; the monthly sheet "Pandora Box," featuring Latin pronunciations; book sales; a Thanksgiving party; and the annual donation auction (netting \$158). Suspended in December were the Shell-of-the-Month talks, replaced by the new three-year series of Classes on Mollusks, introduced in Dr. Robertson's January program, and continued through this season's remaining months with the anatomy of *Polyplacophora*, *Aplacophora*, and *Archaeogastropoda* (scheduled for the 1963-64 season are eight further lectures on *Gastropoda* including four on *Pulmonata*).

Membership for 1963 was 220. Officers elected for the 1963-64 season: Honorary Life President, H. B. Baker; President, Robert J. L. Wagner; Vice-President, Ronald D. Lowden, Jr.; Corresponding Secretary and Treasurer, Freda S. Knauer (925 Callenbrook Road, Drexel Hill, Pennsylvania); Recording Secretary, John D. Parker; Historian, R. Tucker Abbott; Councillors, Minerva Buerk, Ruth Ostheimer, Warner Over, Leonard Richardson, and Charles Wurtz. Meetings are held at 8:00 P.M. (Classes at 7:30), second Thursday of the month (September to May) at the Academy of Natural Sciences of Philadelphia. Back numbers of the *Proceedings* are obtainable at \$1.00 per copy, plus postage.

NEW YORK SHELL CLUB, Marian Schroth, Recording Secretary: Meetings are held the second Sunday of the month, September through June. We meet at 2:00 P.M. in Room 319 of the American Museum of Natural History. William E. Old, Jr., is President for 1963-64. The "New York Shell Club Notes" are published ten times a year. Active and corresponding members total 205 and average attendance has been 65. Usually a "Shell of the Month" and two scientific papers are presented at each meeting. Some presentations are by members of the Museum staff, such as "The Belvedere Expedition to the Gulf of California" by Dr. W. K. Emerson. Other papers by club members were "The Genus *Latiaxis* in Japan," A. D'Attilio; "Misadventures of a *Liguus* Collector," H. Feinberg; "A Trip to Australia and Fiji," S. Sokoloff; "A Trip to El Salvador," M. K. Jacobson; "Collecting in the Virgin Islands," Ethelyn Woodlock; and "Shelling in Puerto Rico," N. Jensen.

Visiting speakers during the past year included Dr. A. W. B. Powell of the Auckland Institute and Museum, Auckland, New Zealand; Mr. Ian Strange, who resides in the Falkland Islands; Mr. and Mrs. George Stephens, who told how they collect Miocene fossils in Virginia; and Mr. Theodore Brauner of Paris, France, a professional photographer who showed his magnificent series of color slides of the courtship, mating, and egg laying of a pair of *Helix aspersa*.

During the year the Club contributed \$100 to the Department of Living Invertebrates of the American Museum and \$25 to the New York Zoological Society toward a marine laboratory to be established at Coney Island.

We went to Orient Point State Park on our Annual Field Trip in June and collected 27 species, despite bad weather.

Current officers: President, William E. Old, Jr.; Vice-President and Public Relations, Josephine Wichern; Recording Secretary, Marion M. Schroth;

Corresponding Secretary, Grace McDougall; Treasurer, Mathilde Weingartner; Historian, Nick Katsaras.

BOSTON MALACOLOGICAL CLUB, Barbara S. Crowley, Secretary: Our club continues to grow. Sixteen new members were welcomed, bringing our total to 88 members.

The eight meetings were well attended and the following programs were enjoyed by members and guests: "Collecting Fresh Water Mollusks in Florida" by Mr. Richard I. Johnson; "Marine Biology Laboratory Systematics-Ecology Program" by Dr. Melbourne R. Carriker; "How Mollusks Move" by Dr. Maurizio Mirolli; "Procedure in Curating" and tour of The Museum of Comparative Zoology Mollusk Department and viewing of the shell collection by Dr. William J. Clench and members of the staff; "How Gastropods Drill" by Dr. Melbourne R. Carriker; "Shell Collecting in the Cook Islands" by Mr. Richard Foster; "Tellinidae of the Western Atlantic" by Mr. Kenneth Boss; "Collecting on The Great Barrier Reef" by Miss Myra Smith. The members enjoyed brief informative talks on a New England "Shell of the Month."

In June the members toured the Marine Biology Laboratory and Aquarium and boarded the new boat *Albatross IV* at Wood's Hole, Mass.

Officers for the 1963-64 season are as follows: Mr. Emmett Baker, President; Mrs. Kay Lawrence, Vice-President; Mrs. Barbara S. Crowley, Secretary-Treasurer; Dr. Ruth Turner and Dr. William J. Clench, Executive Committee; Miss Vida Kenk, Conchological Recorder.

Meetings are held at the Museum of Comparative Zoology in Cambridge, Mass., at 8 P.M. on the first Tuesday of each month from October through May. Visitors are always welcome.

PACIFIC NORTHWEST SHELL CLUB, Elsie Marshall, President: The Pacific Northwest Shell Club's members are widely scattered. Due to this we have meetings in and around Seattle, usually on the third Sunday of the month, 1:30 to 4:00 P.M. Announcements are made in "The Pacific Northwest Shell News." Members write articles of interest for the paper, and Tom Rice is Editor. The May issue was dedicated to Professor Trevor Kincaid, Emeritus, noted Northwest naturalist.

Installation of the 1963 officers was held at the Wharf Restaurant, January 27. Salle Snyder, out-going President, installed Elsie Marshall, President; Lew Livingston, Vice-President; Ann Smiley, Corresponding Secretary; Effie Forthun, Recording Secretary; and Clarice Lynn, Treasurer.

Highlights of the year included writing and adopting a "Code of Ethics" for shell collecting. The intent of the club is to educate the public in conservation of marine life. This Code was presented at the A.M.U. Pac. Div. Convention this year by Dr. Helen Shimota. The Code will be distributed to various organizations.

Members donated shells for two auctions. This contributed substantially to our treasury. One combination auction and picnic was at the Wheelers' in Seattle. Also a picnic was held at the Whiton Residence, Horsehead Bay. A shell-swapping time was had by all!

Dr. Alan Kohn gave an interesting talk on cone shells at the April meeting. This was illustrated by slides and films showing the poison apparatus of the cones in operation. Fall meetings will include a talk on cowries and Ralph Jones' films of South Pacific collecting. His South Pacific shells will be on

permanent display in the new museum, University of Washington, Seattle. Also a display of Northwest shells, made by club members, is in the Seattle Aquarium at Pier 62.

GOOD SHELLING TO ALL!

CONCHOLOGICAL CLUB OF SOUTHERN CALIFORNIA, Bertram C. Draper, Secretary: Meetings of our Club are held at 7:30 P.M. on the first Monday of each month at the Los Angeles County Museum. This year we have moved to the Lounge in the basement of the new Museum wing, where we enjoy a more intimate atmosphere than the large auditorium.

During the past year we have enjoyed presentations on a wide variety of subjects related to conchology and marine biology. Our speakers have come from far and near. The Hartleys from Melbourne, Australia, headed the list for distance, as well as being among the year's highlights. Other visiting speakers included Dr. Barnard of the Beaudette Foundation, Santa Ynez, California; Dave Piatt, Sunset Beach, California, a leader in underwater photography and skin diving; Dr. Stohler from Berkeley, California; Dr. Hardy, President of the Long Beach Shell Club; and Mrs. Fay Wolfson, from San Diego.

Other presentations were by selected members of our own Club. The Jim Starrs told of their trip to Fiji, Tahiti, Moorea, and Bora Bora. Several reports were on various trips to Mexican coasts or waters. Nearly all of these programs were illustrated by slides or movies, enjoyed for their beauty and of great interest.

Three field trips were taken as Club projects. Planned displays were enjoyed at every meeting. Our Editorial Board, John Fitch and Jean Cate are to be thanked for keeping up our participation in the "Western Shell Club News."

Our present officers are: Helen DuShane, President; Roy Poorman, Vice-President and Program Chairman; Bertram Draper, Secretary; James Starr, Treasurer. George Kanakoff is our Sponsor for the Museum. He and Dr. Rudolf Stohler were the 1963 selections for Honorary Life Membership in our Club.

NORTH CAROLINA SHELL CLUB, Hugh J. Porter, Secretary-Treasurer: The North Carolina Shell Club normally meets four times a year: early March, May, late September or October, and early December. Meeting places are dependent upon wishes of the members. Inland meetings are Saturday affairs. Coastal meetings are weekend affairs with activities scheduled to fit in with best collecting times.

This past year, weekend meetings were held in Holden's Beach and at the University of North Carolina's Institute of Fisheries Research in Morehead City. The Holden's Beach meeting was with members from South Carolina's "Grand Strand Shell Club" and, besides the usual beach collecting, included collecting in a few nearby South Carolina fossil pits. At Morehead City, the club chartered two shrimp boats for a collecting trip to Cape Lookout. In spite of rough seas, few of the 60+ on the trip got seasick.

Inland meetings were held at the University of North Carolina's Medical School in Chapel Hill and at the State Museum in Raleigh.

Programs during both inland and coastal meetings included movies, book reviews, shell exhibits, and taxonomic workshops led by Dr. John Ferguson. At one meeting, Dr. R. L. Menzies spoke to the group on Duke University's

new oceanographic program and on his research on *Neopilina*. As usual, socializing was a part of each meeting.

Officers for the year are: President, Mr. Carl Withrow; Vice-President, Mrs. Smith Whiteside; Secretary-Treasurer, Mr. Hugh J. Porter; members of the Executive Committee, Mr. James E. Wadsworth and Mr. Harry Davis. Club membership continues at approximately 200.

THE BROWARD SHELL CLUB, Mrs. Terry Marsh, Corresponding Secretary: We have completed our first successful and happy year of interesting, stimulating meetings and Shell Hunts. The Broward Shell Club meets second Wednesday of every month, 8 P.M., at Cypress Plaza Community Hall, South Pompano Beach, Florida.

Elected officers serving for 1963-64 are: President, Herb Burchell; Vice-President, Dr. Grace Hunter; Treasurer, Mrs. Neil Hepler; Recording Secretary, Mrs. Jean Redding; Corresponding Secretary, Mrs. Terry Marsh. Appointed officers are: Shell Hunt Co-Chairmen, Mr. and Mrs. Irvin Meseke; Publicity Chairman, Mrs. Arlene Saxer; Program Chairman, Mrs. Terry Marsh; Junior Member Chairman, Miss Klaire Fenko; Meeting Hall Chairman, Mr. Neil Hepler; Question Box Chairman, Mr. Jack O'Connell; Advisory Consultant, Mr. Earl Chesler.

Our programs have consisted of speakers: Dr. Don Moore, Research Instructor, Marine Lab. of University of Miami; Lt. Col. Corrine Edwards; James Donovan; and Earl Chesler. We viewed underwater movies, the movie, "Mollusks, a Story of Adaptation," and another on "Panama." We enjoyed colored slides from Mr. Balma in Australia, slides on the family Muricidae and the family Volutidae. We had a Christmas and Anniversary party, plus a successful and lively Shell Auction. Our Shell Hunts were held at Bimini, Bahama; Bear Cut, Miami; Peanut Island, Palm Beach Co.; Jap Rocks, Boca Raton; Sanibel Island; Marco and Little Marco Islands. Our first Annual Picnic was held at Boynton Inlet.

We issued the first volume of our Club publication, "The Review," which we hope to be able to continue yearly. We are especially grateful to the New York Shell Club, Philadelphia Shell Club, Jacksonville Shell Club, Naples Shell Club, and Palm Beach County Shell Club for their generous help, support, and cooperation.

Added new features planned for our second year's meetings are "Shell-of-the-Month," a short discourse on a particular shell by members; "Question Box," identification period by an appointed committee.

Do stop in and visit with us when you are in this area—we would enjoy meeting everyone.

SACRAMENTO VALLEY CONCHOLOGICAL SOCIETY, Wyllie Taylor, Secretary: This past year has brought many challenges and rewards. One of the highlights of the year for our club was the Asilomar convention, at which we were co-hostesses with the Berkeley Club. It was such a pleasure to work with Bob Talmage; we are sure that if the rest of the conventioners enjoyed the meetings as much as we did in serving, it was a complete success.

Another activity enjoyed by members of the Club was the exhibit at the Placer County Fair. It was so successful that we have been asked to enlarge our participation to include a whole display room next year.

There were many other exciting events, such as our annual Christmas party, trips to the ocean, films, shell studies, guest speakers, and shell sales.

We have added many new books to our circulation library which have proved invaluable to all of our members, and especially to the junior class.

Membership in our club is highly respected because of the friendly atmosphere which we feel is a direct result of having meetings in our homes. These are held on the second Saturday of each month. Officers of our club for 1963 are: President, Mary Long; Vice-President, Victor Haack; Recording Secretary, Wyllie Taylor; Corresponding Secretary and Treasurer, Bertha Finke; and Librarian, Gladys Demuth.

ST. PETERSBURG SHELL CLUB, Annabel Wetzel, Corresponding Secretary: Our 1962-63 season was extended, meetings being held on the second and fourth Friday of each month, October through April, at St. Petersburg Junior College.

Program for the year was "A.M.U. Highlights" and "A Dredging Trip in the Gulf," Dan Steger; "Shunting (Shell Hunting) in the Pacific," James Lewis, *St. Petersburg Times*; "The Sense of Smell in Mollusks," Gerald Robinson, University of South Florida; "Pearlers" and "Creatures of the Barrier Reef," sound color movies; "Adventures in Shell Exchanging," Roger Dunn; "Our Friend, the Mollusk," Edgar Evans, St. Petersburg Junior College; "Window on the Sea," Mary D'Auito; "Australian Volutes," pictorial review; "Echoes of the Shell Show," displays and candid shots; "Self-Defense (for Sea Critters)," sound movie; "Feeding Habits of Mollusks," Emily Smith; "Observations on *Donax variabilis* (the Coquina)," Miss Patricia Simmons, Florida Presbyterian College.

The nine field trips were well attended and shelling quite good, despite the abnormally cold season.

The 16th annual Shell Show was held February 13 through 18. Judges were Dr. Katherine V. W. Palmer, Dr. Ruth D. Turner, and Dr. George K. Reid. The Smithsonian Award went to Percy and Mina Slinn for an exceptional display of *Pleuroploca gigantea*.

The annual picnic was held on Sunshine Skyway. Weather was fine, tide good, shelling excellent.

Mina Slinn's informative display of books, literature, and clippings on sea and shell life, as well as Dorothy Hanssler's table display of Florida shells and various other displays contributed by other members, stirred much interest at each meeting.

Officers elected for 1963-64: President, Dorothy Hanssler; 1st Vice-President, Percy Slinn; 2nd Vice-President, Robert Lipe; Treasurer, Roger Dunn; Recording Secretary, Selma Lawson; Corresponding Secretary, Annabel Wetzel; Councillors-at-Large, Dr. Francis Smith and William Reader.

NATIONAL CAPITAL SHELL CLUB, Mrs. Richard H. Hagemeyer, Secretary: Activities of the National Capital Shell Club for the year 1962-63 were led by Dr. Joseph P. E. Morrison, President; assisted by Mr. Harris P. Dawson, Vice-President; Mrs. Richard H. Hagemeyer, Secretary; Mrs. Carl I. Aslakson, Treasurer; and Mr. Norman Meese, Historian.

The Club met at 8:15 P.M. in Room 43 of the U.S. National Museum on the fourth Thursday of the month from September through May. In June a group went on a picnic and all-day outing to the Scientists Cliffs on the eastern shore of Maryland.

Programs throughout the year included reports of summer activities; an open discussion on cleaning and preparation of specimens for display; an

outline of the history and present-day problems in the Seychelles; a series of slides showing color and design in shells, some greatly magnified to show the smallest detail, a truly beautiful series; a discussion on distribution of brackish-water fauna; an illustrated talk on work being done to control snails that carry the organisms that cause schistosomiasis; a shell auction; and, to top the year's activities, a talk by Mr. George Kline outlining the history, geographical and topographical layout, and shelling grounds of Ceylon.

Officers for the coming year are: President, Mrs. Carl I. Aslakson; Vice-President, Cdr. W. M. Thorsson; Secretary, Mrs. J. Kenneth Lewis; Treasurer, Mrs. Geo. C. Rickard.

Meetings will be at the same time and place on the 4th Thursday of the month, beginning on the 26th of September, for the coming year.

NAPLES SHELL CLUB, Lou Mason, President and Correspondent: The time and place of our meetings have been changed, so that with the start of the new season in October (through May), members will meet on the third Thursday of the month at the Community Room of the new Naples Federal Building at the Four Corners. Officers are: President, Lou Mason; Secretary, Norman P. Sloan; Treasurer, Edith Polly; Historian, Virginia Magee. Visitors in this area are always welcome to attend our meetings or call to chat about shells.

Our Fourth Annual Shell Show, a 3-day event in February, was highly successful, both financially and as entertainment for the public. Judges Mr. and Mrs. Carl Chandler of Fort Myers Beach and Mr. and Mrs. James Donovan of West Palm Beach performed wonders in awarding ribbons for the vast array of outstanding exhibits. Special Rosettes were awarded as follows: Most Outstanding Beach Shell, Virginia Magee for a *Busycon contrarium*; Shell of Show, Thelma Cornell for a *Cardium pseudolima*; and Most Unusual Shellcraft, Mrs. Henry Keller for a beautiful flower arrangement.

Shell Show dates for 1964 will be February 21, 22, and 23 at the Woman's Club Auditorium. Happy shelling to all you patient beach-pounders.

THE SANTA BARBARA MALACOLOGICAL SOCIETY: At this writing the Santa Barbara Malacological Society has been in existence less than one year. Credit for the Club's being goes to Nelson Baker, Faye Howard, and Gale Sphon of the Museum of Natural History staff, who instituted the Club and assisted the isolated shell collectors and those interested in the phylum Mollusca to become organized and to interest others.

Officers were elected in September, 1962, and bylaws adopted. The intervening time has been spent doing the multitudinous things required for a firm foundation—organizing, setting up committees, planning, projecting programs, and getting acquainted.

Highlights of the year were the acceptance by Dr. Nelson Baker of the Club's Junior Program, the discovery by Faye Howard of a new species, and a shell auction which set the club on its feet financially. During the year the S.B.M.S. affiliated with the A.M.U. and was host at the A.M.U.P.D. Conference held in Goleta, California. Study groups were projected with the Ventura-Oxnard group in operation at this writing.

Taxonomy courses and a public Shell Show are projected for 1963-64.

Officers for 1962-63 are: Ted Phillips, President; Jack Brookshire, Vice-President; Gladys Hailey, Treasurer; Woody Cramer, Recorder; Don Rowland, Corresponding Secretary.

Time and place of meetings: third Thursday of each month at 2559 Puesta Del Sol, Santa Barbara.

(Also affiliated with the American Malacological Union: Connecticut Shell Club, Greater Baltimore Shell Club, Greater St. Louis Shell Club, Hawaiian Malacological Society, Kauai Shell Club, Long Beach Shell Club, Northern California Malacozoological Club, San Antonio Shell Club, Shell Club of the Ryukyu Islands, South Carolina Grand Strand Shell Club.)

AMERICAN MALACOLOGICAL UNION CONSTITUTION

(Proposed)

ARTICLE I

Organization and Objective

Section 1.—This organization shall be called "The American Malacological Union."

Section 2.—Its object shall be the promotion of the science of malacology by holding meetings for reading and discussing papers, and for furthering the interests of students and collectors of shells by facilitating acquaintance and co-operation among the members.

ARTICLE II

Membership

Section 1.—Membership in the organization shall consist of the following classifications:

(1) Regular membership, open to persons resident in the western hemisphere, who are interested in the collection and study of mollusks.

(2) Corresponding membership, open to persons ineligible for regular membership because of geographical location.

(3) Life membership, open to those who pay as a lump sum, an amount equivalent to twenty (20) years' current annual dues, with no further annual dues required.

(4) Honorary life membership, recommended by at least ten (10) members in good standing, may be bestowed by unanimous vote of the Council and a majority voice vote of the AMU membership attending an annual meeting upon persons who have made outstanding contributions to malacology. Honorary life membership shall not be limited to AMU members and may not exceed ten (10) at any one time. Honorary life members shall pay no dues or assessments.

Section 2.—Regular and corresponding memberships shall be granted to those making written applications to the Secretary of the AMU. The annual dues will be those specified in the Bylaws.

ARTICLE III

Council and Officers

Section 1.—The government of the AMU shall be vested in a Council, which shall consist of the currently elected officers, all living past presidents, and four (4) councillors-at-large.

Section 2.—The Council shall hold meetings at least annually, usually during an annual meeting of the AMU, to consider questions of policy, administration, and such other matters as may be brought before it. At other times, the Council may meet on call of the currently elected President to consider matters pertaining to the administration of the AMU, or vote on them by mail. Not less than five (5) members of the Council present at any annual meeting shall constitute a quorum for the proper conduct of AMU business.

Section 3.—The officers of the AMU shall be a President, an Executive Vice-President, one or more Vice-Presidents depending on the number of organized Divisions, a Secretary, a Treasurer, a Publications Editor, and four (4) Councillors-at-Large.

Section 4.—The currently elected Chairman of an organized Division shall automatically become an AMU Vice-President.

Section 5.—By unanimous vote of the Council and a majority voice vote of the AMU membership attending an annual meeting, the title of Honorary Life President may be conferred upon any AMU member (normally one who has previously been an AMU President) in recognition of contributions to the AMU and to malacology that are of an unusually outstanding nature. There shall be only one Honorary Life President at any one time. He will hold this title for life and shall pay no dues or assessments.

ARTICLE IV

Geographical Divisions

Section 1.—With the approval of the Council, groups of AMU members in good standing, who live within a specified geographical area, may establish a Division of the AMU for the purpose of organizing and conducting annual regional meetings, or other local meetings, under AMU auspices. Areas covered shall be defined specifically and shall not overlap.

Section 2.—The officers of a Division shall be a Chairman, a Vice-Chairman, a Secretary, a Treasurer, and such other additional officers as the Division may desire, all of whom shall constitute an Executive Board for the purpose of conducting the business of the Division.

Section 3.—A Division shall prepare appropriate Bylaws under which it shall be governed. Such Bylaws shall not abridge or supersede any Article or Section of the AMU Constitution and Bylaws. Division Bylaws, or any subsequent additions or changes in them shall be approved by the AMU Council before becoming effective.

Section 4.—A Division Treasurer shall be empowered to accept AMU membership dues and assessments, and transmit them promptly to the AMU Treasurer along with appropriate lists of names and addresses in duplicate, a copy of which is for the information of the AMU Secretary.

Section 5.—The currently elected Chairman of a Division shall, as an AMU Vice-President, be a voting member at an annual or other meeting of the AMU Council. In the event of inability to attend a Council meeting at which Division representation is necessary or desired, a Division Chairman may delegate his voting rights to a qualified AMU member of the Division in good standing, who is able to attend such a meeting.

ARTICLE V

Shell Club Affiliation

Section 1.—Any locally organized shell club or similar organization, meeting regularly or occasionally for the primary purpose of promoting knowledge of conchology or malacology, may affiliate with the AMU upon application to the AMU Council for its approval.

Section 2.—The annual affiliation fee for such clubs or organizations shall be as specified in the Bylaws.

ARTICLE VI

Amendment Procedures

Section 1.—Any proposal to amend, add, or repeal any Article or Section in this Constitution shall be prepared by a committee, appointed by the currently elected President, for the purpose of drafting necessary or desired changes. Otherwise, such a proposal shall bear the signatures of at least ten (10) AMU members in good standing.

Section 2.—Any such proposal shall be submitted to the President or to the

Council at least two months prior to an annual meeting for verification of its constitutionality. If approved by the Council, the proposal may be discussed at the next annual meeting. Adoption of the proposal, when approved in final form by the Council, shall be by two-thirds majority vote in a mail ballot.

Section 3.—Copies of the approved proposal, along with an appropriate ballot, shall be mailed to all AMU members in good standing by the AMU Secretary as soon as practicable. Approximately one month shall be allowed for the return of ballots. The AMU Secretary shall tally the vote at the end of this period, or the President may appoint a Tally Committee to count the ballots. The result of the vote shall be certified to the Council, who will declare the proposal adopted or rejected as of the date of certification.

ARTICLE VII

Bylaws

Section 1.—The AMU may enact Bylaws interpreting any Article or Section of this Constitution. The procedure for adopting, amending, or repealing any Bylaw shall be as specified in the Bylaws.

BYLAWS

ARTICLE I

Dues, Assessments, and Fees

Section 1.—The annual dues of regular members living in the United States and in other countries having the same as the U. S. domestic postal rates shall be three dollars (U. S.) (\$3.00). The annual dues of other regular members, and of corresponding members shall be three dollars and fifty cents (U. S.) (\$3.50). Any additional person in the family of an AMU member desiring to become a member may join for annual dues of one dollar (U. S.) (\$1.00).

Section 2.—Annual dues shall become payable on January 1 of each year and shall be credited to that year for accounting purposes. Members who are in arrears for more than one year shall be dropped by the Secretary from the list of membership in good standing.

Section 3.—Upon appropriate vote of the AMU members within any geographical area in which a Division is organized, the regular membership dues may be supplemented by an annual assessment in a fixed amount, to be billed, along with annual dues, to all members living within the area covered. An assessment may be changed or rescinded by a similar vote of the members involved. The Council shall approve all assessments before they become effective.

Section 4.—The annual affiliation fee for a local shell club or comparable organization shall be six dollars (\$6.00), payable on January 1. In return for this fee each affiliated club or organization in good standing will be entitled to the publication in an AMU annual Bulletin of a review of its activities and other desired information of a length not to exceed five hundred (500) words. Affiliated clubs in arrears for more than one year shall be dropped by the Secretary from the list of those in good standing. To the extent possible and practicable, affiliated clubs shall place the AMU Secretary on the mailing lists to receive copies of club publications, reports, and notices sent to club members.

ARTICLE II

Council Duties

Section 1.—The Council shall pass on all matters involving AMU policy.

administration, and operations, and shall exercise its approval authority on matters specifically covered in the Constitution and Bylaws. Its decisions shall be subject to ratification by a majority voice vote of the AMU members in good standing who attend annual meetings. The Council shall act in an advisory capacity on all matters brought to its attention by the President.

Section 2.—The annual meeting of the AMU shall be held at such time and place as may be fixed by the Council at the preceding annual meeting.

ARTICLE III

Terms of Office and Duties of Officers

Section 1.—The terms of office of the officers and the councillors-at-large shall normally be one year, beginning one month after election at an AMU annual meeting, except that the Treasurer shall serve beginning on January 31 following election.

Section 2.—The officers shall perform the usual duties of their offices.

(1) The President shall carry the responsibility of organizing and presiding at an annual AMU meeting.

(2) The President shall appoint an Auditing Committee, a Nominating Committee, and such other standing and special committees as he may deem advisable. Such committees shall serve for at least one year, or less as circumstances may require.

(3) The Executive Vice-President shall act for the President if the latter is unable to serve, and shall assist the President on request.

(4) The Secretary shall take all minutes at Council and AMU business meetings, transcribe them as promptly as possible, and transmit a copy to the President for review. The Secretary shall also take notes during AMU meetings such as may be appropriate, obtain abstracts of papers presented, and prepare an annual AMU report, which shall include the reports of Division secretaries, records of action taken by the Council and by the membership in business meetings, lists of regular and corresponding members and of affiliated clubs in good standing, and such other information on AMU activities as may be of interest to the membership. In addition the Secretary shall prepare a special written report covering the activities and expenses of the office during the year, and shall submit an estimate of the probable expenses of the office for the next calendar year to the Treasurer. Until such time as the AMU is financially able to compensate the Secretary properly for services rendered, all reasonable travel and living expenses incurred in attending annual AMU meetings shall be paid from available AMU funds, to be considered part of regular annual meeting expense.

(5) The Treasurer shall be responsible for the proper handling and recording of all AMU funds. He shall receive all dues, assessments, and fees, and shall keep the Secretary currently informed so that up-to-date lists of AMU members and affiliated clubs in good standing may be maintained for publication in annual AMU Bulletins and for other purposes. The AMU Treasurer shall forward all accumulated Division assessments to Division treasurers on a quarterly basis. The Treasurer shall work closely with the Auditing Committee appointed by the President.

(6) Within one month after an annual AMU meeting, the Treasurer shall submit a written financial report of the meeting to the Auditing Committee for approval and transmittal to the newly elected President for review. In addition, not later than January 31, the Treasurer shall submit a written financial report to the Auditing Committee covering the previous calendar year. This report shall include all monetary transactions of the AMU of

whatever nature during the year, as well as an account of AMU financial status as of December 31 of the year. The Auditing Committee shall approve this report before it is submitted to the President and the Council for review, and for subsequent approval by the membership at the next annual AMU meeting.

(7) The Treasurer may make monetary advances from available AMU funds, upon request, to the President, the Secretary, and to the Chairman of organized Divisions to cover some of the initial expenses of organizing annual meetings. Such advances shall be accounted for or repaid as soon as possible after the meetings. Any excess or deficit of income over expense resulting from an AMU annual meeting shall be applied to the organizing costs of future AMU meetings. Treasurers of organized Divisions shall handle profits or losses from annual Division meetings in the same manner. In this connection, it shall be expressed AMU policy that all annual meetings held under its auspices shall pay for themselves each year as nearly as possible from adequate registration fees paid by attending members and guests, and from gifts or other funds donated specifically for meeting purposes.

(8) The Publications Editor shall be responsible for editing all AMU publications, and for arrangements for publishing them. The Editor and the Secretary shall work together as an Editorial Board in developing the format and content of AMU annual Bulletins and other AMU publications. They shall maintain records of printing and distribution costs, separately for each publication, and report on them annually to the Treasurer along with any requested estimates of future publication costs. The Editorial Board may recommend the undertaking of new AMU publications, which shall require Council approval.

ARTICLE IV

Auditing and Nominating Committees

Section 1.—The Auditing Committee, appointed by the outgoing President, shall consist of three members in good standing. This Committee shall keep informed of all financial aspects of the AMU, audit the books and reports of the Treasurer, and act in an advisory capacity when called upon by the Treasurer.

Section 2.—The Nominating Committee shall consist of not less than three nor more than five members of the Council, exclusive of existing officers. They shall prepare a list of officers and councillors-at-large for the ensuing year, present it at a Council meeting for review and approval, and then submit it to the membership attending an annual meeting, where a majority voice vote will determine election. In the event candidates are nominated from the floor at the annual meeting, election shall be determined by written ballot mailed by the Secretary to all AMU members in good standing, to be returned within one month from the date of mailing. Officers shall be declared as elected upon certification of the results of a majority of the ballots by the Secretary, except that if a Secretary be nominated from the floor, the President shall appoint a Tally Committee to count ballots and certify the result. Membership in good standing in the AMU for a period of not less than two immediately prior years shall be an eligibility requirement for the nomination for any AMU office. No eligible AMU member shall be nominated for any office without prior consultation on a willingness to serve.

ARTICLE V

Amendment to Bylaws

Section 1.—Any proposal for the addition, amendment, or repeal of any

Article or Section of these Bylaws shall be handled and voted on in the same manner as provided in Article VI of the Constitution.

Approved: Constitution & Bylaws Committee

Date Sept. 2, 1963

Allyn G. Smith, Chairman

Dr. Elmer G. Berry

Dr. A. Byron Leonard

AMERICAN MALACOLOGICAL UNION PACIFIC DIVISION

BYLAWS

(Proposed)

ARTICLE I

Section 1.—Organization. This organization shall be known as the American Malacological Union, Pacific Division, and as such is an integral part of the national organization, The American Malacological Union.

Section 2.—Purpose. The purpose in forming the Division is to give members of the American Malacological Union living in the Pacific area opportunity to attend annual regional meetings.

Section 3.—Pacific Division area. The geographical area covered by the Pacific Division shall be bounded on the south by the Mexican border, on the north by the Canadian border, and on the west and east, in general, by the 170th and 105th meridians, except that Guam and all of the states of Montana, Wyoming, Colorado, and New Mexico shall be included, with Texas excluded. This area shall hereinafter be referred to as the Pacific Division area. AMU members with A.P.O. and Navy addresses in the Pacific shall be included in this area.

Section 4.—Administration. For purposes of administration, the Pacific Division shall consist of its officers and the standing and interim committees appointed to carry on the business of the Division.

Section 5.—AMU Constitution and By-Laws. No provision in these By-Laws shall be interpreted as superseding or abridging any provisions in the Constitution and Bylaws of the national organization.

ARTICLE II

Section 1.—Executive Board. The administration of the affairs of the Division shall be vested in an Executive Board, which shall consist of the currently elected officers and the three most recent and available past Chairman of the Pacific Division. Its Chairman shall be the current Division Chairman.

(1) The terms of members of the Board, exclusive of Division officers, shall be one year beginning one month after the close of the annual meeting. The terms of officers shall be those specified in Section 5 (1) of this Article.

(2) Vacancies on the Board may filled through appointment by the Chairman, preferably from among previous Chairmen.

(3) No person shall be a Board member who has not been a member in good standing of the American Malacological Union for at least two preceding consecutive years.

Section 2.—Executive Board meetings. The Board shall meet annually during a Division annual meeting, prior to the regular business meeting, and at

such other times as agreed upon by a majority of the Board. Insofar as possible, matters requiring action between Division annual meetings shall be handled through a poll of the Board by the Chairman.

Section 3.—Annual Division meetings. The time and place of the annual Division meeting shall be decided by the Board.

Section 4.—Executive Board authority. The Board shall pass on all matters involving policy, but its decisions are subject to ratification by a majority vote of the AMU members in good standing attending an annual meeting, who are in the Pacific Division area.

Section 5.—Division officers. The officers of the Division shall be a Chairman, a Vice-Chairman, a Secretary, an Assistant Secretary, a Treasurer, and an Assistant Treasurer.

(1) Terms of office of these officers shall normally be one year, beginning one month after election at an annual meeting, except that the Treasurer and Assistant Treasurer will serve for a calendar year beginning January 31 following their election.

(2) Whenever an annual meeting of the national organization is held within the Pacific Division area, the currently elected Division officers and Executive Board members shall serve for a second year without re-election.

Section 6.—Duties of officers. The officers shall perform the usual duties of their offices.

(1) The Chairman shall preside at annual meetings and be generally responsible for the activities of the Pacific Division. He shall appoint an Auditing Committee, a Nominating Committee, and such other committees as he deems desirable. He shall, as a Vice-President of the AMU, act as liaison with the officers and the Council of the AMU, either personally or by delegation of authority to a qualified member of the AMU in the Pacific Division area.

(2) The Vice-Chairman shall act for the Chairman if the latter is unable to serve, and shall assist the Chairman on request.

(3) The Secretary shall take all minutes of Executive Board and business meetings, transcribe them as promptly as possible, and transmit a copy to the Chairman for review. The Secretary shall also take such notes during annual meetings as may be appropriate, obtain abstracts of papers presented at annual meetings, prepare an annual report of the Pacific Division meeting, and submit this report to the Chairman for his review and for transmittal to the AMU Secretary for inclusion in the AMU Annual Report. The Secretary shall also handle all necessary correspondence, as directed by the Chairman or as otherwise required, keep the other members of the Executive Board informed on matters that concern them, and maintain the records of the Division.

(4) The Assistant Secretary shall be responsible to the Secretary and shall handle such reasonable secretarial duties as the Secretary may assign in order to provide for an equitable division of the secretarial load.

(5) The Treasurer shall be responsible for handling and recording all incoming and outgoing funds of the Pacific Division. He shall receive such AMU dues and Division assessments from regular and new members as may come to him and shall forward them promptly to the AMU Treasurer. He shall keep an up-to-date list of the AMU members within the Pacific Division area who are in good standing, based on the list maintained by the AMU Treasurer, and shall keep the Division Secretary informed of the current status of this list.

(6) Within one month after the annual meeting the Treasurer shall sub-

mit a financial report of this meeting to the Auditing Committee for approval and transmittal to the newly elected Chairman for review. In addition, not later than January 31 following the annual meeting, he shall prepare and submit a final calendar-year financial report to the Auditing Committee, which shall include all monetary transactions of the Division during the year.

(7) The Auditing Committee shall consist of three qualified AMU members in the Pacific Division area, appointed by the outgoing Chairman. This committee shall approve all financial reports prepared by the Treasurer before they are submitted to the newly elected Chairman for review. Subsequent approval shall be obtained at the next annual Division meeting from the Executive Board and by majority voice vote of the AMU members attending this meeting.

(8) The Assistant Treasurer shall be responsible to the Treasurer and shall handle such reasonable financial duties as the Treasurer may assign in order to provide for an equitable division of these duties.

Section 7.—Nominating Committee. Candidates for Division offices shall be nominated by a Nominating Committee of three, appointed by the Chairman from the list of past Chairmen. The Committee shall present its slate of nominations at the annual business meeting. Election may be by majority voice vote, but if there is more than one candidate for an office a majority vote by written ballot will determine election.

(1) No candidates shall be nominated without prior consultation as to their willingness to serve.

(2) AMU membership in good standing in the Pacific Division area for a period of not less than two immediately preceding consecutive years shall be required as eligibility for officer candidates.

(3) If a written ballot is required, the Chairman shall appoint a Tally Committee, apart from nominated officers, to count ballots and certify the result.

ARTICLE III

Section 1.—Membership. Classes of membership in the Pacific Division area of the AMU will be those specified in the AMU Constitution and By-laws.

Section 2.—Award of Honor. An AMU-Pacific Division Award of Honor is hereby established, to be conferred in recognition of outstanding accomplishments or contributions in the fields of conchology or malacology.

(1) Not more than one such Award shall be conferred in any one year, nor shall one necessarily be conferred each year. Two or more members of a family working together may receive an Award jointly.

(2) Nominations for an Award, accompanied by suitable documentation, shall be submitted in writing to the Executive Board, signed by not less than five AMU members in good standing in the Pacific Division area, before January 1 of the year in which the Award is to be conferred. The Board must approve the nomination in writing and present it formally at a Pacific Division annual meeting for final acceptance by majority vote.

ARTICLE IV

Section 1.—Dues. Annual membership dues will be those stated in the Bylaws of the AMU.

Section 2.—Assessment. An additional amount may be assessed by written ballot majority vote of the AMU members in good standing in the Pacific Division area after approval by the Executive Board and favorable action on a motion to refer the question to the appropriate members in an annual

meeting. Upon approval, the assessment shall take effect on the following January 1. Any assessment may be changed or rescinded by a similar course of action. The current assessment shall be fifty cents (\$0.50) per member.

(1) Any Pacific Division assessment shall be based on the current list kept by the Division Treasurer as provided in Article II, Section 6 (5) of these Bylaws and shall be billed, in addition to regular AMU dues, by the AMU Treasurer.

(2) The Pacific Division assessment shall be used for the purpose of promoting and handling annual meetings and for such other purposes related to the administration of the activities of the Pacific Division as may be approved by the Executive Board.

Section 3.—Costs of annual meetings. In the handling of annual meetings of the Division the intention shall be to cover all legitimate costs by any or all of the following means: (1) A registration fee to be paid by all AMU members, except Honorary Members, and guests attending, in an amount established by the Chairman after consultation with the Division Treasurer; (2) an assessment, as covered in Section 2 of this Article; (3) donations or gifts of funds from AMU members and friends, or from other sources; and (4) loans from the AMU.

(1) Any excess income over expenses attributable to an annual meeting shall be retained in a special account by the Division Treasurer, to be allocated against the expenses of subsequent meetings; likewise, any deficit shall be carried over and covered, to the extent practicable, by subsequent registration fees or other applicable funds for annual meeting expenses. All loans or advances from the AMU for handling Pacific Division annual meetings shall be repaid as promptly as possible.

ARTICLE V

Section 1.—Amendments. Any proposal to amend, add, or repeal any Bylaw of the Pacific Division shall be prepared by a Bylaws Committee appointed by the Chairman for the purpose of drafting necessary or desired changes. Otherwise, such a proposal must bear the signatures of at least ten AMU members in good standing in the Pacific Division area.

(1) Any such proposal shall be submitted to the Chairman at least two months before an annual meeting of the Pacific Division for referral to the members of the Executive Board for their consideration and for verification of constitutionality. If approved by the Executive Board, the proposal may be discussed at the next annual meeting. If no objection is raised in open meeting, the proposal may be adopted by a two-thirds majority vote of the AMU members in good standing in the Pacific Division area, who are in attendance. If objection is raised by any such member, the proposal will be carried over for adoption or rejection by a similar vote at the next succeeding meeting of the Pacific Division.

(2) The vote to adopt or reject any proposed changes in these Bylaws may be based on the proposed changes as a whole, or separately on changes in individual articles or sections that are contained in the proposal.

Approved:

PACIFIC DIVISION BYLAWS COMMITTEE

Allyn G. Smith, Chairman
Albert R. Mead
Rudolf Stohler

28 August 1963

ACTIVE MEMBERS

Membership List Revised October 15, 1963

* Pacific Division member

- Abbott, Dr. R. Tucker, Dept. of Mollusks, Academy of Nat. Sci., Philadelphia 3, Pa.
 Adams, Lawson, 2100 S. Bay St., Milwaukee 7, Wisc. (Amateur.)
 Aguayo, Dr. Carlos G., College of Agriculture, Mayaguez, Puerto Rico.
 Akers, Mrs. Frank, 334 Chilean Ave., Palm Beach, Fla.
 *Albert, Mrs. Ernest, Post Eng. Rycom., Bldg. & Grds. Br., 8135 A.V. APO 331, San Francisco.
 *Alexander, Mrs. Robt., 8542 Lemon Ave., La Mesa, Calif.
 Alexander, Robert C., 423 Warwick Rd., Wynnewood, Pa.
 Allen, Dr. J. Frances, 5702 Queen's Chapel Rd., W. Hyattsville, Md.
 Allen, Miss Letha S., 107 W. 29th St., Baltimore 18, Md. (All shells.)
 Allen, Lester E., 187 Argyle St., Yarmouth, Nova Scotia.
 *Allen, Dr. S. F., 6234 W. 87th St., Los Angeles 45, Calif. (X-Rays of internal structure of shells.)
 *Allison, Edwin C., 5262 Rincon St., San Diego 15, Calif. (Fossil, Recent and mega-micro marine invertebrates.)
 Allwell, Mrs. Stephen S., 803 Evesham Ave., Baltimore 12, Md. (Rapididae; Magilidae; Coralliophilidae.)
 American Assn. Advancement Science, 1515 Massachusetts Ave., Washington 5, D. C.
 Anderson, Miss Edna L., 610 Parker St., Jacksonville 2, Florida.
 Anderson, Miss Katherine M., Box 206, Chillicothe, Ohio. (*Pecten*, *Murex*.)
 Armstrong, Mrs. Eliot, 14 Meadow View Place, Buffalo 14, N. Y.
 Ashford, Ben E., P.O. Box 7241, St. Petersburg, Fla. (Tropical and semi-tropical marines.)
 Ashbery, Mrs. Wallace H., 12 E. Depew Ave., Buffalo 14, N. Y.
 Ashworth, Ann S. and Jas. H., 9265 N.W. 32 Ct. Rd., Miami, Fla. (Live shells.)
 Aslakson, Capt. and Mrs. Carl I., 5707 Wilson Lane, Bethesda 14, Md. (World marine shells.)
 Athearn, Herbert D., R.F.D. No. 5, Cleveland, Tenn. (Fresh-water mollusks.)
 Athearn, Mrs. Roy C., 5105 No. Main St., Fall River, Mass. (Land shells.)
 Atwater, Rev. David T., 50 Grace Court, Brooklyn 2, N. Y.
 Awald, Clifford J., 162 Southwood Dr., Kenmore, N. Y.
- **Baily, Dr. and Mrs. Joshua L., Jr., 4435 Ampudia St., San Diego 3, Cal.
 *Baker, E. P., 11619 Downey Ave., Downey, Calif. (Exch. Pacific Coast shells.)
 Baker, Emmett B., 7 Riverview Ave., Kingston, Mass. (General interest.)
 Baker, Dr. and Mrs. Horace B., Zoological Lab., Univ. of Penn., 38th St. and Woodland Ave., Philadelphia, Pa. Res. 11 Cheltenham Rd., Havertown, Pa.
 Baker, John A., 1064 N.W. 28th St., Miami 37, Fla. (General interest.)
 *Baker, Nelson W., 279 Sherwood Dr., Santa Barbara, Calif. (General interest.)
 Ballentine, Mr. and Mrs. Corbin C., 126 E. Par Ave., Orlando, Fla. (Specimen shells and Florida fossil shells.)
 Barbosa, Frederico Simoes, Caixa Postal 1626, Recife, Pernambuco, Brazil. (Freshwater shells.)
 *Basch, Dr. Paul F., George Williams Hooper Foundation, Univ. of Calif. Medical Center, San Francisco 22, Calif. (Freshwater pulmonates.)
 Beaumont, J. V., 904 Orange St., Apt. B., New Orleans 13, La.
 Beaven, Dr. and Mrs. J. Mahlon, 175 W. Ridgewood Ave., Ridgewood, New Jersey. (Amateurs; beautiful shells.)

- *Beck, Mrs. R. G., 4040 State St., Space 135, Santa Barbara, Calif.
- Becker, Mr. and Mrs. Albert F., 2157 Sunrise Dr., La Crosse, Wisc. (Mississippi River shells.)
- Becker, Miss Louise W., 2 Lexington Ave., Buffalo 22, N. Y.
- Bedell, Adele Koto, 2643 Laundale Dr., Beloit, Wis.
- *Bedford, Chas. A., R.R. 1 Gower Point, British Columbia, Canada. (Marine life in general.)
- Beetle, Mrs. Dorothy, Charlotte Children's Nature Museum, 1658 Sterling Road, Charlotte 9, N. C. (Land, freshwater shells.)
- *Behrens, Grace, Molokai General Hospital, Hoolehua, Molokai, Hawaii. (Abalone; starfish.)
- Bengston, Mrs. Geo., Rt. 4, Independence, Iowa. (Land, f.w. and fossils.)
- *Bequaert, Dr. Jos. C., Dept. of Entomology, Univ. of Arizona, Tucson, Ariz.
- Berg, Dr. Clifford O., Dept. Entomology, Cornell Univ., Ithaca, N. Y. (Flies which kill and eat snails.)
- Berg, Mrs. Frederick C., Georgetown, Md. (Shells of the Fla. Keys.)
- **Berg, Mr. and Mrs. Fred, 214 Milpas, Santa Barbara, Calif.
- *Bergeron, Eugene, P.O. Box 1236, Balboa, Canal Zone. (Biol. Survey Panamic Range mollusks.)
- Berrier, Theo., 2540 Massachusetts Ave., N.W., Washington, D. C. (All shells.)
- Berry, Dr. and Mrs. Elmer G., National Institutes of Health, Bethesda 14, Md.
- *Berry, Dr. S. Stillman, 1145 W. Highland Ave., Redlands, Cal.
- *Bickford, Glen, 2350 W. 250th St., No. 39, Lomita, Calif. (W. American marine shells; world Haliotidae.)
- Bijur, Jerome M., 65 Lancaster Ave., Paoli, Penn. (Florida shells.)
- Bippus, Alvin C., 2743 Sagamore Rd., Toledo 6, Ohio. (Marine univalves.)
- Bixby, Mrs. H. M., Look See, Captiva, Florida. Summer: Bolton Landing, New York.
- Blaine, Mr. and Mrs. Alger P., 74 Palmer Ave., Springfield, Mass. Winter: 237 19th Ave., South St. Petersburg 5, Fla.
- *Bleitz, Mrs. Mary Lou, 3228 California Ave., S.W., Seattle 16, Wash. (Shells of Puget Sound.)
- Blinn, Walter C., Dept. Nat. Sci., Mich. State Univ., E. Lansing, Mich. (Ecology and behavior of land snails.)
- Boca Grande Hotel, Boca Grande, Florida.
- Bodden, Mrs. John M., Cleveland Museum of Natural History, Cleveland, Ohio.
- Boston Malacological Club, c/o Barbara Crowley, 109 Lexington St., Watertown, Mass.
- Bowin, Hugh, 11600 Gulf Blvd., Treasure Island 6, Fla.
- Bradfield, Mrs. Jesse, Mt. Alto, Rome, Ga. (General collecting.)
- Bradley, J. Chester, 604 Highland Rd., Ithaca, N. Y.
- Bradley, John C., 469 Farmington Ave., Waterbury 10, Conn. (Travel and collect.)
- Brakefield, Gertrude E., 3830 7th St., N., St. Petersburg, Fla. Summer: Water Wonderland, Indian River, Mich.
- Branson, Branley A., Dept. of Biology, Kansas State College of Pittsburg, Pittsburg, Kansas. (S. W. gastropods & fishes.)
- *Bratcher, Twila L., 8121 Mulholland Terrace, Hollywood, Calif.
- Brimmer, Allen, 9805 Parkwood Dr., Bethesda 14, Md. (*Harpa*; Cephalopoda, *Spondylus*; *Dentalium*.)
- Broadus, James M. III, 430 W. 6th St., Lexington, Ky. (Gulf of Mexico species.)
- Brogan, Matthew C., 4122 Bergenline Ave., Union City, N. J. (*Littorina*—regional study.)
- Brooks, Mr. and Mrs. John C., 711 S. Indian River Dr., Ft. Pierce, Fla. (Florida marine mollusks.)
- Broward Shell Club, 1140 N.E. 24th Ave., Apt. "C," Pompano Beach, Fla.
- *Brown, Dorothy, 1451 N. Ogden Dr., Los Angeles 46, Calif. (Pectenidae.)
- Brown, Mr. and Mrs. N. C. L., 21 Browns Ave., Scottsville, N. Y.

Brown, Mrs. Ward, 1420 N. Lakeside Dr., Lake Worth, Florida.

Broyles, Mrs. Ralph E., 5701 Fairfield Ave., Ft. Wayne 6, Ind.

Brugman, Chas., Box 468, Lahaina, Hawaii. (Shells and black coral of Hawaii.)

*Brunson, Dr. Royal Bruce, Montana State Univ., Missoula, Mont.

*Bryan, Edwin H., Jr., Bishop Museum, Honolulu 17, Hawaii. (Pacific biogeography and bibliography.)

Buerk, Minerva S., M.D., Bryn Mawr Med. Bldg., Bryn Mawr, Penn.

Burch, Dr. John Bayard, Museum of Zool., U. of Mich., Ann Arbor, Mich. (Land and f.w. mollusks.)

**Burch, Mr. and Mrs. John Q., 4206 Halldale Ave., Los Angeles 62, Calif.

Burchell, Herbert R., 991 S.W. 13th St., Boca Raton, Fla.

Burgers, Dr. and Mrs. J. M., 4622 Knox Rd., Apt. 7, College Park, Md. (Amateurs.)

*Burton, Helen A., 391 Adams St., Oakland 10, Calif.

Cardeza, Carlos M., 3829 Gertin St., Houston 4, Texas. (Making collection properly.)

Carley, T. S., 407 Kingston, Deerfield, Ill. (General interest.)

Carriker, Dr. Melbourne R., Biol. Lab., U.S. Bureau Comm. Fisheries, Oxford, Md. (Morphology of drilling mechanism in gastropods; ecology.)

Cartwright, Mrs. Jas. B., 4533 Park Ave., Memphis 17, Tenn. (Atlantic and Gulf Coast shells.)

Carpenter, Maj. and Mrs. Walter, Det. 1, Manag. and Analysis, APO 757, N. Y. (Exch.; buy; sell.)

**Cate, Mr. and Mrs. Crawford N., 12719 San Vicente Blvd., Los Angeles 49, Calif. (*Cypraea*, *Mitra*)

**Chace, Mr. and Mrs. Emery P., 3446 Van Dyke Ave., San Diego 5, Calif.

Chamberlin, Dr. Lockwood J., 509 Franklin St., Alexandria, Va.

Chatham Marine Shell Museum, Box 621, Chatham, Mass. (Winter: P.O. Box 2344, Ft. Myers, Fla.)

*Cheever, Dr. Austin W., 1330 St. Louis Drive, Honolulu 16, Hawaii.

*Christensen, Carl, 1311 Wawe Pl., Honolulu 18, Hawaii. (*Conus*, *Cypraea*, *Voluta*.)

Clarke, Dr. Arthur H., Jr., Dept. of Mollusks, National Museum of Canada, Ottawa, Canada.

Clarke, Dr. Rosemary, 2049 University Ave., Dubuque, Iowa.

Clements, Mr. and Mrs. Curtis L., Betty's Hawaiian Village, Sanibel Is., Fla.

Clench, Dr. William J., Museum of Comp. Zool., Cambridge 38, Mass. (Collect, exchange, buy.)

Cloidt, Chas. J., 371 Prospect Ave., Avene 1, N. J. (Shells of New Guinea, Philippines.)

Closs, Dr. Darcy, Escola de Geologia (Universidade do Rio Grande do Sul) Avenida Paulo Gama sn. Porto Alegre (RGS), Brazil. (Cephalopods, Pelecypods.)

*Coan, Eugene, 891 San Jude Ave., Palo Alto, Calif.

Coastal Bend Shell Club, % Corpus Christi Museum, Corpus Christi, Texas.

*Coats, Miss Ruth E., 3846 Skyline Rd., Carlsbad, Calif.

Cole, Mrs. Beatrice M., P.O. Box 1003, Naples, Fla. (Worldwide; exch.)

Coleman, Mrs. Nellie, 5308 Third Ave. So., St. Petersburg, Fla.

Coley, Mrs. Gene, Carolina Apts., 840 Carolina Ave., Winston-Salem, N. C.

Compitello, Mrs. Juliette, 399 St. John's Place, Brooklyn 38, N. Y.

*Conchological Club of So. Calif., Los Angeles County Museum, Los Angeles, Calif.

Conchological Section, Buffalo Society Nat. Sciences, c/o Mrs. Leslie Potter, 6350 Main St., Williamsville 21, N. Y.

Condé, Vincente, Redpath Museum, McGill Univ., Montreal, Canada.

Conkling, Jos. E., Box 264, Edgartown, Mass. Winter: Leders San Rick Lodge, Marathon Shores, Fla. (Collect; buy; sell; exch.)

Connecticut Shell Club, Peabody Museum, New Haven, Conn.

- Connecticut Valley Shell Club, Springfield Museum Nat. History, 236 State St., Springfield, Mass.
- Conrath, James P., 127 Indiana St., Rapid City, So. Dak. (Shell photography)
- Coomans, Dr. H. E., Am. Museum Nat. Hist., Central Park W. at 79th St., New York 24, N. Y.
- Cooper, Robt. W. and Marjorie, 5012 Pfeiffer Rd., Peoria, Ill. (Fla. marines; world *Murex*, *Pecten*, *Spondylus*.)
- Corbett, Wm. Phelps, 2939 Nelson St., Ft. Myers, Fla. (Exch. rare *Cypraea*, *Olivia*, *Murex*.)
- Cornell University Library, Ithaca, N. Y.
- Cowles, Edward F., Jr., 12 Hillcrest Ave., New Rochelle, N. Y. (Tropical marine shells; photography.)
- *Craig, Mrs. Anne Gwynne, San Carlos Trailer Court, Apdo. 88, Guaymas, Sonora, Mexico.
- Craine, Ruth A., 82 So. Broad St., Norwich, N. Y.
- *Cramer, Frances L., Life Science Dept., E. Los Angeles College, 5357 Brooklyn Ave., Los Angeles 22, Calif. (Ecology; conservation.)
- Crum, Mrs. Dan, 930 N.E. 23rd St., Crest Haven, Pompano Beach, Florida. (*Conus*; *Voluta*.)
- Cull, Mrs. R. R., 7927 Chippewa Rd., Brecksville, Ohio.
- Cummings, Raymond W., 121 Rugby Rd., Syracuse, N. Y.
- Daley, Timothy T., Social Service Dept., Box 310, Nova Scotia Hospital, Dartmouth, N. S. (Atlantic coast mollusks.)
- D'Amico, Joseph S., 119 Persimmon Lane, Lake Jackson, Texas.
- D'Attilio, Mr. and Mrs. Anthony, 44 Lynwood Dr., Valley Stream, L. I., N. Y.
- Danforth, Miss Louise L., Box 415, Vineyard Haven, Mass. (New Eng. shells.)
- Darling, F. Murray, 3313 Achusnet Ave., New Bedford, Mass. (Marine life.)
- Davis, Dr. George, University Museums, Ann Arbor, Mich.
- Davis, Harry T., Director, North Car. State Museum, Raleigh, N. C.
- Dawley, Dr. Charlotte, The Women's College, University of N. C., Greensboro, N. C.
- Dawson, Mr. and Mrs. Harris P., Jr., 5226 Farrington Rd., Washington 16, D. C.
- Dawson, Mr. and Mrs. H., Jr., 3704 Albemarle St., N.W., Washington 16, D. C.
- Deatrick, Paul A., P.O. Box 35-366, Miami, Fla. (*Strombus*, *Busycon*.)
- Decker, Mrs. Madaline G., 6299 34th Ave., N., St. Petersburg 10, Fla.
- DeLuca, Miss Gladys and Mrs. John A., 16 Oakland Ave., Wollaston 70, Mass.
- DeRoy, Jacqueline, Isla Santa Cruz, Galapagos, Ecuador
- Desmond, Hon. Thos., 94 Broadway, Newburgh, N. Y.
- DeStefano, Dr. and Mrs. Fredrick, 55 W. Elizabeth, Brownsville, Texas. (Gulf of Mexico shells.)
- Deupree, Wm. W., 276 Buena Vista, Memphis 12, Tenn.
- *DeVore, Mrs. Henrietta, Roberts Star Route, Prineville, Ore.
- *DeWitt, Mr. and Mrs. Harlon L., Jr., 1507 W. 104th St., Los Angeles 47, Calif. (Mexican and Pacific Coast shells.)
- DeWitt, Robt. M., Biol. Dept., Univ. of Fla., Gainesville, Fla.
- Dexter, Dr. Ralph W., Dept. of Biology, Kent State Univ., P. O. Box 507, Kent, Ohio.
- Diemond, John D. and Alice W., 17471 Gulf Blvd., St. Petersburg 8, Fla. (World shells.)
- Dietrich, Mr. and Mrs. Louis E., 301 Veri Ave., Pittsburgh 20, Pa. (Mollusks of the West Indies.)
- Djordjevic, Branimir, 335 Samford Ave., Auburn, Ala.
- Dodd, William E., M.D., Ocean St. & Bay Ave., Beach Haven, N. J.
- Dodge, Mary W., Upper Station Rd., Garrison, N. Y. (East coast and Florida shells.)
- Donahue, Enid P., P.O. Box 35, Sanibel, Fla.
- Doucette, Margaret, 10 William St., Waterford, Conn. (Collecting)
- Donnelly, John F. and Katherine, 131 E. 26th St., Holland, Mich.
- Donovan, James W., 3718 Calvin Ave., West Palm Beach, Fla.

- *Drahorad, Mrs. Karl, P.O. Box 73, Nehako P.O., Kitimat, B. C., Canada. (No. Pacific coast.)
- *Drake, Robt. J., Dept. of Zool., Univ. of British Columbia, Vancouver 8, B. C., Canada
- Duarte, Eliseo, Casilla Correo 1401, Central, Montevideo, Uruguay. (Exch. shells and information.)
- *Duggan, Mrs. Eleanor, 4722 Baker Dr., Everett, Wash.
- Dundee, Dr. Dolores S., Div. of Science, Dept. Biology, LSU in New Orleans, New Orleans 22, La. (Land mollusks, f.w. mussels.)
- Dunn, V. Roger, 5021 18th Ave., S., Gulfport, Fla. (*Conus*.)
- **DuShane, Mr. and Mrs. Joseph, 3552 Hollislope Rd., Altadena, Calif.
- Dvorak, Stanley J., 3856 W. 26th St., Chicago 23, Ill. (Muricidae.)
- *Eaton, Miss Ruth E., 3333 Orange St., Riverside, Cal.
- Echardt, Mary Jean, 35 Prospect Park West, Brooklyn 15, N. Y.
- Eddison, Grace G., M.D., 4740 Iselin Ave., Riverdale 71, N.Y. (World marines)
- Edmiston, Mrs. J. R., % Cudahy Packing Co., Omaha, Neb.
- Eggleston, Dr. Harla Ray, Chairman, Dept. of Biol., Marietta College, Marietta, Ohio.
- Emerson, Dr. Wm. K., Am. Museum of Nat. Hist., Central Park W. at 79th St., New York 24, N. Y.
- Emery, Adle K., Box 1265, South Miami, Florida. (Fla. E. coast marines.)
- Enders, Mr. and Mrs. Ernest M., 3 Ellen Dr., Farmington, Conn.
- Endres, Theo. F., 633 Pleasant St., Algonac, Mich. (Amateur.)
- Erickson, Carl W., 4 Windsor Ave., Auburn, Mass.
- Eubanks, Mrs. Edwin W., 5108 Spring Glen Rd., Jacksonville 7, Fla. (Florida marine shells.)
- *Eyerdam, Walter J., 7531 19th Ave. N.E., Seattle 5, Wash.
- Faulkinbury, R. P., 106 Pensacola Ave., Fairhope, Ala. (Small shells of N.W. Florida and Alabama.)
- Feinberg, Harold, 2334 Tiebout Ave., Bronx 58, N. Y. (Land, freshwater.)
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 *Richmond, Mrs. Ruth, 222½ Reeves Dr., Beverly Hills, Calif. (*Murex*; *Spondylus*.)
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- Russell, Dr. Loris S., Dept. of Resources and Development, Nat. Museums of Can., Ottawa, Ontario, Canada.
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- San Antonio Shell Club, c/o Barbara Halbardier, 1911 W. Huisache, San Antonio, Tex.
- Sanford, Mrs. Walter S., Sherburne, N. Y.
- Sanibel-Captiva Shell Club, c/o Mrs. Henry E. Nickerson, Box 2342, Captiva, Fla.
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 Weisbord, Norman E., Dept. Zool., Fla. State Univ., Tallahassee, Fla. (Cenozoic and
 Recent mollusca.)

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- Kile, Chas. O., Trust Territory, Pacific Islands, Yap, W. Carolines.
- Malacological Society of Australia, 351 Glenferrie Rd., Malvern, Melbourne, Australia.
- Ministry of Agriculture, Fisheries & Food, Fisheries Lab., Burnham-on-Crouch, Essex, England. (Oysters and their pests; *Buccinum*; *Mytilus*; *Cardium*.)
- Moreno, Feliza and Ricardo Gallego, Schistosomiasis Control Project, Palo, Leyte, Philippines.
- National Lending Library for Science and Technology, Boston Spa, Yorkshire, England.
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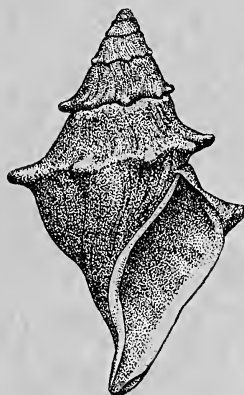
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Pacific Division



ANNUAL REPORTS
for 1964



AMU, Thirtieth Annual Meeting
AMU, PD, Seventeenth Annual Meeting

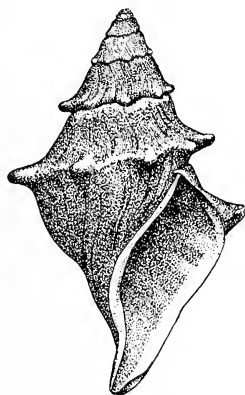
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Bulletin number 31, December 1, 1964. Issued annually by the American Malacological Union, Inc. Editorial Board: Morris K. Jacobson, Editor, Margaret C. Teskey, Secretary. Office of Publication: Route 2, Box 318, Marinette, Wisconsin.

AMERICAN MALACOLOGICAL UNION THIRTIETH ANNUAL MEETING

New Orleans, Louisiana

July 21-24, 1964

When at the 1963 meeting it was announced that the next annual AMU meeting would be held in New Orleans, doubt and anticipation held equal sway. "Nobody goes to New Orleans in the summertime . . . hot . . . mosquitoes . . . too far away . . . hot . . . hot . . . hot!"

But once their invitation had been accepted the Doctors Dundee—Dolores and Harold—paid the doubters no never mind, as they say in the South, instead went right to work to plan a meeting packed with unusual features. Upon reading the list of scheduled highlights interspersed among scientific sessions, one wondered how four days might possibly contain them all. But careful and detailed planning paid off as one event dovetailed into the next, and one hundred (give or take a few) AMU members and their guests enjoyed an annual meeting that will be remembered and discussed for a long time to come.

Headquarters was the Sheraton-Charles Hotel, handy both to busy Canal Street and its stores and to the French Quarter. All sessions were held in well-equipped, air-conditioned meeting rooms on the hotel balcony and the lobby was ample and suitable for chatting. Indeed, those addicted more to comfort than to sightseeing or shopping had no need to leave the hotel save for two evening excursions to partake of the annual banquet and to enjoy the riverboat excursion.

On Tuesday morning Dr. Harold Dundee set up his efficient registration facilities on the balcony overlooking the lounge and soon the familiar badges were in evidence everywhere. Each person registering was given a folder containing sightseeing guides of New Orleans and the French Quarter, a mimeographed list of the mollusks of the area, and a program of the meeting itself. This last was adorned with a cut of *Io fluvialis* Say which has become the recognized symbol of the AMU.

Registration over, visiting was the order of the day until 1:00 P.M. when President John Q. Burch pounded the official gavel to signal formal opening of the thirtieth annual meeting.

He introduced Dr. Dolores Dundee, "Whose guests we all are and who has worked long and hard to bring us all together under such comfortable circumstances."

Dr. Dundee—who is Dee to one and all—expressed warm greetings to the assembled delegates, explaining that all were the guests not only of her husband and herself but of her school, Louisiana State University in New Orleans. "We so wanted you to come, and we're not lacking in southern hospitality, but since we do have a transportation problem it seemed wiser to use the hotel as headquarters."

She in turn introduced Dr. Homer L. Hitt, Chancellor of L.S.U. in New Orleans.

Chancellor Hitt startled his audience by remarking that he was sorry everyone listening was not older, "For a few years hence you would be holding this meeting on a beautiful lake front instead of downtown. Right now we would be unable to convince you that we're constructing the South's most beautiful campus, for what's beautiful about a bulldozer? But for now, between sessions you must seek relaxation on Bourbon Street instead of collecting snails around Lake Pontchartrain."

He sketched briefly the rapid growth of his school whose facilities include an outstanding science building with a research center yet in the planning stage. "This building you'll have to see on your next visit. For now, enjoy your stay in America's most interesting city."

In thanking Dr. Hitt, President Burch remarked that every schoolboy knows, or should know, the colorful history of New Orleans. "Many of us recall the city in what we like to think of as the good old days: that was when I knew it best, some fifty years ago." He then introduced the first paper:

OBSERVATIONS ON ADVERSE RELATIONS BETWEEN THE HYDROID, *HYDRACTINIA ECHINATA*, AND CERTAIN MOLLUSKS. Arthur S. Merrill, U. S. Bureau of Commercial Fisheries and Biological Laboratory, Oxford, Maryland.

(Abstract)

Hydractinia echinata is a polymorphic hydroid that grows by increasing the number of individuals in a colony. The hydroid lives frequently as an epizoon on the external shell surface of the sea scallop, *Placopecten magellanicus*. When a colony reaches the shell edge of the scallop it expands over and around the shell margin and attempts to establish on the internal shell surface. This intrusion interferes with normal mantle activity of the host scallop, which in turn affects growth and causes shell malformation.

Observations indicate that gastropods, too, are not immune to the effects of direct association with *Hydractinia echinata*. Several species (*Nassarius trivittatus*, *Lunatia heros*, *Buccinum undatum*, and *Epitonium greenlandicum*) were observed to have reacted to the presence of the advancing zooids of a colony by enlarging the area of their apertures. The apertures often become badly deformed, extremely enlarged, and globose.

Thus, *Hydractinia echinata*, which normally uses a shell simply as a substrate, is capable of becoming a harmful epizoon. This type of relationship in which one of the associates is inhibited while the other is not affected is best described by the term *amensal* as defined by Eugene Odum (1953, *Fundamentals of Ecology*, W. B. Saunders Company, Philadelphia).

(Slides of infected sea scallops and various Gastropoda accompanied this paper.)

President Burch: "In California we have many hydroids, one most common on *Donax Gouldi*, for instance."

BEHAVIOR OF UNIONID GLOCHIDIA.¹ William H. Heard and Sherman S. Hendrix, Florida State University, Tallahassee, Florida, and Gettysburg College, Gettysburg, Pennsylvania. Read by Dr. Heard.

¹ This investigation was supported (in part) by grant 26-036 from the Florida State University Research Council, 1963-1964.

(Abstract)

Lefevre and Curtis (1912, *Bull. Bur. Fish.*, 30) investigated the reactions of glochidia of several species of unionid mussels to a variety of fishes' blood, chemical reagents, and physical stimuli. They reported (1) that hookless glochidia (subfamilies Unioninae and Lampsilinae) are typically gill parasites of fishes, and that their attachment is a chemical response, and (2) that hooked glochidia (subfamily Anodontinae) are generally fin parasites whose attachment has a physical (i.e., tactile) basis.

Arey (1921, *J. Exp. Zool.*, 33), however, after a more extensive study, concluded that responses to tactile stimuli are exhibited by glochidia in all three subfamilies, and that this behavior alone is adequate to insure attachment to the host fish. Furthermore, while certain chemicals may stimulate glochidial closure, varied responses occur, and these are related to the concentration of the reagent utilized.

Our observations on the glochidia of *Carunculina paula*, *C. villosa*, *Lampsilis anodontoides floridensis*, *L. claibornensis*, *L. excavatus*, *Villosa lienosa*, and *V. vibex* (all in Lampsilinae) support Arey's conclusions. Blood from 24 species of fishes representing 10 families in 7 orders evoked a variety of glochidial responses, presumably caused by different concentrations of chemicals in the blood: from increased flapping of the valves to immediate and permanent closure. Inorganic compounds as well as organic compounds representing products of digestion were also utilized. Among the organic reagents used, the 20 natural L amino acids (1×10^{-1} M concentration) which make up protiens provided the most interesting results: all but the three basic amino acids (arginine, histidine, and lysine) stimulated immediate closure. Glochidia of *Lampsilis anodontoides floridensis* and *L. claibornensis* were exposed to varied concentrations (1×10^1 , 1×10^{-1} , 1×10^{-2} , 1×10^{-3} , 1×10^{-4} , and 1×10^{-5} M) of the 20 amino acids, and stronger reactions were observed at greater concentrations. *Lampsilis anodontoides floridensis* exhibited an all-or-none response, while *L. claibornensis* showed a more graduated behavior; and the former displayed a stronger response than did the latter to the same lower concentrations. Both species responded only weakly to 1×10^1 concentrations of the basic amino acids and not at all to lesser concentrations.

While physical stimuli may bring about attachment, the responses to chemical stimuli may serve to insure continued attachment until the glochidium is overgrown by host tissue to form the cyst. Free amino acids in the fish blood and in the lysed host tissues probably serve the additional function of providing a sufficiently quantitative source of component units for protein synthesis during the metamorphosis from the parasitic larval stage to the free-living juvenile stage in the life history of the mussel.

(This paper was illustrated by projected maps of the drainage systems under discussion together with their distribution of mussels, then charts of response to blood of fishes, human blood, and that of a rooster by six species of mussels.)

Van der Schalie: "Has Max Ellis come up with anything in his studies along these lines?" Heard: "No, but I plan to borrow his knowledge in my own later studies." Donald Moore: "Dall in 1889 said that some deep-sea

mollusks produce glochidia." Heard: "I read something of that, but it seems not to have been substantiated."

THE FOREIGN FRESHWATER SNAILS NOW ESTABLISHED IN
PUERTO RICO.¹ Harold W. Harry, Texas A. and M. Marine Laboratory,
Galveston, Texas, and Rice University, Houston, Texas.

(Abstract)

Foreign Mollusca are those introduced by human agency into an area remote from their native territory. The most certain criterion for recognizing foreign snails or bivalves is (1) detailed knowledge of the circumstances of introduction. Should this not be available, several of the following criteria taken together are useful in distinguishing exogenous species: (2) the time of importation can be reasonably estimated from previous familiarity with the fauna of the area; (3) the suspected import may have no close relatives in the area where it is introduced; (4) the species tends to remain in habitats much affected by human activity; (5) the import remains localized in the new area, and has no natural vagility to invade new habitats there; (6) the species is known to be a foreign snail in other areas; (7) the species may have enormous population densities in their new home, exceeding the population densities of native snails.

By the above criteria, six of the 27 freshwater Mollusca of Puerto Rico are exogenous. Two of them are hosts of trematodes of medical importance. The three foreign prosobranchs are the only members of their families on the island, and they are apparently absent over much of the area between Puerto Rico and their indigenous territory, even though seemingly suitable habitats occur in the intervening area. They have enormous population densities in Puerto Rico, and have been deliberately spread about the island in unsuccessful attempts to control *Taphius glabratus* Say, the indigenous snail host of *Schistosoma mansoni*.

The three exogenous pulmonates belong to families and even genera indigenous to the island. They do not produce excessively abundant populations. The exact circumstances of their introduction are unknown, but the approximate time of introduction of two of them can be estimated by comparing the eight faunal lists of the freshwater Mollusca of Puerto Rico published between 1854 and 1964. In the following list, the numbers in parentheses by each snail indicate the above criteria which indicate that it is exogenous.

Thiara granifera Lamarck (2, 3, 5, 6, 7) is reputedly the host of the lung fluke, *Peragonimus westermani*, but this worm has not been reported from Puerto Rico. The frequent statement in the literature that this snail lacks males and that the eggs develop by parthenogenesis is erroneous. The sex ratio is about one male per five females in Puerto Rico.

Marisa cornuarietis Lamarck (2, 3, 4, 5, 6, 7) has been much studied in attempted biological control of the schistosome vector snail. However, no studies have been made on the ecology of *Taphius glabratus*, *M. cornuarietis*, and schistosomiasis in northern South America, in the area where the natural ranges of the two snails overlap, and Manson's schistosomiasis is present.

Pomacea cumingii King (1, 4, 5, 7) is a common species in aquaria hobby shops, but it has not been recorded as a foreign snail from anywhere but Puerto Rico.

¹ Supported in part by NSF Grant GB 820.

Lymnaea columella Say (2, 6) is a notorious tourist snail and a probable host of *Fasciola hepatica*, a trematode already present on the island (transmitted also by the native *L. cubensis*). Several human cases of the cattle liver fluke are on record in Puerto Rico.

Helisoma foveale Menke (3, 4, 5, 6) is known from the earliest faunal lists. However, this snail is almost exclusively limited to artificial habitats in Puerto Rico. The time of its introduction into the islands of Curaçao and St. Croix is known. It may be indigenous to Cuba, Jamaica, and possibly Mexico.

Taphius cf. *pallidus* C. B. Adams (2, 4?, 5?) is a native of Jamaica, and possibly also Central America and northern South America. This snail was first found in Puerto Rico in 1957. In 1961 it occurred as one of four exogenous snails (together with several exogenous fish and aquatic plants) in the Quebrada Sabana Llana near Rio Piedras.

As he concluded, Dr. Harry remarked that some foreign mollusks may be regarded as weeds in their adaptive ability and prospective scope; he advised those who may be instrumental in causing the spread or transfer of a species to carry through a program of observation which is sure to be valuable. He also made a strong plea for periodic faunal lists, saying that a conscientious census of a given area may be most useful, if not now, certainly in the future. (Local shell clubs please note!)

WHO WERE THE SOWERBYS? Katherine Van Winkle Palmer, Paleontological Research Institution, Ithaca, New York.

(Abstract)

The name "Sowerby" has been used commonly for five individuals of four generations of English naturalists to designate the authorship of an enormous number of generic and specific taxa of living and fossil invertebrates. Excluding the notable work in botany of the Sowerby family, the descriptions and illustrations of shells and fossils from over the world were multitudinous. Chief among those who were mineralogists, paleontologists, and conchologists were: James (1757-1822); James de Carle (1787-1871) and George Brettingham I (1788-1854), sons of James; George Brettingham II (1812-1884), son of George Brettingham I; and George Brettingham III (1843-1921), son of George Brettingham II. James was the founder of the famous London publishing establishment. All members of the family helped and were trained in various stages of the making of illustrations. At James' death, James de Carle, with a brother Charles Edward, carried on the business. The brother George Brettingham ran a similar independent project which was continued by G. B. Sowerby II, followed by G. B. Sowerby III, who eventually united with Hugh Fulton as "Sowerby and Fulton, conchologists." This became the Hugh Fulton Company. G. B. Sowerby III died in 1921. Some of the well-known works of the Sowerbys were: *British Mineralogy* (1804-1817), five volumes, 550 colored drawings, by James; *Mineral Conchology of Great Britain* (1812-1846), seven volumes, colored drawings, begun by James, continued by James de Carle; *Genera of Recent and Fossil Shells* (1820-1834), 42 numbers, begun by James, continued by James de Carle and George Brettingham I; *Thesaurus Conchyliorum* (1843-1887), begun by G. B. Sowerby I, continued by G. B. II, and completed by G. B. III; illustra-

tions in Reeve's *Conchologia Iconica* and completion of volumes 15-20 (1865-1878) by G. B. H. James and James de Carle frequently have the authorship explicit but subsequent common reference to author does not include a distinguishing initial. The three G. B. Sowerbys, because all used the same initial, are predominantly grouped under the same authorship. G. B. Sowerby II could be separated because his name was followed by "Junr." Because of the continuation of their major works by more than one Sowerby, because original authorship may not be differentiated, and because of the extensive publishing of parts and plates without respective dates, difficulty is encountered in establishing a proper date for the Sowerbys' publications. Laborious efforts have been expended by various authors in ascertaining detailed dates of the parts, pages, and plates of the Sowerbys' major books. Chief compilers have been Newton (1891), Sykes (1906), Sherborn (1909), and Shaw (1909).

The catalog of the books and manuscripts in the British Museum (Natural History) in which the Sowerbys, particularly the G. B. Sowerbys, "First, Second, and Third of the name" are differentiated has been an important tool for the bibliographers.

Through the courtesy of the British Museum (Natural History) and R. J. Cleeveley of its Palaeontology library a fine photograph of James Sowerby and genealogical record of the Sowerbys were furnished. No photographs of the other four Sowerbys were available.

(Projected was the Sowerby genealogy, a portrait of James Sowerby [1757-1822], and a number of plates made by various Sowerbys from as many publications.)

President Burch: "Please publish this paper! I've handled many old English collections and so many of the shells bore the Sowerby label."

FRESHWATER MOLLUSCA FROM THE EARLY TERTIARY OF PATAGONIA. Juan J. Parodiz, Carnegie Museum, Pittsburgh, Pennsylvania.

(Specimens of the fossils under discussion were on display.)

(Abstract)

The earlier continental Eocene deposits of southern South America contain an abundant molluscan fauna, some of which is autochthonous, but the majority is of North American origin. The fresh-water strata in Patagonia are mostly Paleocene, with Hyriidae, Thiaridae, Viviparidae, Pleuroceridae, Valvatidae, and Potamididae appearing in South America for the first time. Terrestrial mollusks of the autochthonous families Strophocheilidae and Bulimulidae are more abundant in Eocene strata. Some families which are characteristic of Recent South America, such as the Ampullaridae and Xanthonycidae, were absent during the early Tertiary, and their oldest fossils are only Pliocene or Pleistocene. Before the Paleocene epoch, Patagonia as well as other structural components of South America had no connection with the North American continent. It is now well established that the first land communication came into existence at the very limit of the Cretaceous-Tertiary times, and immediately a faunal migration of considerable proportions took place. The migration of freshwater organisms, along the new water systems of the western side accompanying the Andean upheaval, was parallel with

that of the primitive mammals of which representatives are found in the Rio Chico Formation (Danian) of Patagonia, and all having come from North America. The Unionacea, represented by the characteristic genus *Diplodon*, were already known from the Triassic of Pennsylvania and Texas, and are now extinct in the northern hemisphere. *Pyrgulifera* (Thiaridae), first described for the Cretaceous Bear River Formation of Wyoming, is found in the Paleocene of Patagonia as well as in chronologically equivalent strata of the Argentine-Bolivian border. *Lioplacodes* (Viviparidae) also from the Cretaceous of the United States is abundant in Paleocene Patagonia. These Patagonian fossils belong to the Jahuel Formation—which is parallel and synchronical with that of Chico Rio containing the mammals—and are mostly found in older shoreline situations of what was the San Jorge Sea of Danian age, with the freshwater strata mixed with other brackish-water or intertidal marine deposits. This condition is also found in other deposits of Paleocene age of the Puca Formation with the same or similar fauna from Bolivia to Ecuador. Here again we found other vertebrates, such as the turtle *Podocnemys*, which was primarily known from the Cretaceous of Montana, together with the gastropods *Pyrgulifera* and *Potamides*. Terrestrial families such as Strophocheilidae also began to appear in the Paleocene of Patagonia (the Schuen facies of Jahuel Formation), but became more common in the Eocene (Casamayor Formation) together with the Bulimulidae: *Paleobulimulus*, *Thaumastus*, the lacustrine Chiliniidae, and the characteristic mammal fauna of *Notosylps*. The most abundant fossils of the freshwater fauna are the Unionacea (Hyriidae): *Diplodon bondenbenderi* and *pehuenchensis* D.-J., *D. colhuapiensis* Ihering, *D. burckhardtii* M.-E., and *D. transandinus* Par. and also the Thiaridae and Pleuroceridae as "*Melania*" *ameghiniana* D.-J., showing closer affinities with the *Goniobasis* group of North America.

The relationships of the early Patagonian fauna of mollusks were discussed half a century ago by Pilsbry, Ortmann, and Ihering, but at that time very few fossils were known. The present summary is from part of a monograph in preparation about the continental Tertiary Mollusca of South America based on recent extensive collections and revision of types and clarified stratigraphy.

GEOGRAPHIC DISTRIBUTION OF AMERICAN BRACKISH-WATER MOLLUSKS. Joseph P. E. Morrison, U. S. National Museum, Washington, D. C.

(NO ABSTRACT SUBMITTED)

(Projected distribution maps, slides portraying the mollusks under discussion, and a mount of 20 specimens accompanied this paper.)

President Burch: "My son Tom, who has just resumed an active interest in shells, once sent back from Liberia a lot of large *Arca* shells he found living in water so fresh it was used for drinking."

A PHENOMENON ASSOCIATED WITH SEXUAL BEHAVIOR IN POLYGYRID SNAILS. Walter C. Blinn, Michigan State University, E. Lansing, Michigan.

(Abstract)

Laboratory-maintained animals of *Mesodon thyroidus* (Say), *Allogona*

profunda (Say), and *Triodopsis multilineata* (Say) occasionally exhibit a transitory, dome-like swelling between the dorsal tentacles. This phenomenon, which appears most frequently during periods of increased mating activity in the terraria, has been observed only in adults—usually in animals with swollen and prominent genital areas. Although sometimes observed immediately prior to and even (in *T. multilineata*) during courtship maneuvers, the swelling is most prominently displayed by animals that sit in solitude and remain almost motionless for considerable periods. All observations point to the conclusion that this display usually precedes sexual encounter and courtship.

Of possible explanations, the simplest is that the swelling is a mechanical result of internal pressures coincident with sexual arousal and that it has no other particular significance. A more attractive possibility is that the swelling is a specialized emitter or receptor site involved in chemical attraction or detection of potential mates.

(Several slides of living snails exhibiting the abnormality were shown.)

Morrison: "I don't think you can consider this a chemical receptor. It seems more likely to be some generic abnormality."

FRESHWATER MOLLUSKS OF THE HUDSON BAY WATERSHED, DISTRIBUTION PATTERNS AND DETERMINANT INFLUENCES.

Arthur H. Clarke, Jr., National Museums of Canada, Ottawa, Ontario, Canada.

(Abstract)

Just north of the Mississippi-Missouri and St. Lawrence basins lies a vast area of partially interconnected river systems, the Hudson Bay Watershed. About 100 species and subspecies of freshwater mollusks occur here, and all major North American families except Pleuroceridae are represented.

Based on distribution, three general groups can be distinguished: (I) endemic elements (about 10% of the total); (II) holarctic elements (about 15%); and (III) southern elements (about 75%). Group I contains several taxa which appear to have evolved since the Pleistocene (e.g., *Valvata sincera ontariensis* and *Stagnicola arctica*). Group II includes species which penetrate farther into the Canadian arctic than any others, i.e., to Baffin Island and Victoria Island. Members of this group include *Lymnaea stagnalis*, *Stagnicola palustris*, several sphaeriids, etc. Group III is composed principally of species which reach their northern limits within this region, and it is sometimes possible to correlate these limits with biological and geological factors and with isotherms.

In the Unionidae, for example, several species apparently invaded the Hudson Bay Watershed during postglacial confluence from the Mississippi-Missouri Basin by way of the Red River. Some of these (*Fusconaia flava*, *Quadrula quadrula*, *Crenodonta plicata*, *Lasmigona costata*, and *Proptera alata*) have not penetrated beyond southern Manitoba; others (*Ligumia recta*, *Lampsilis ovata ventricosa*, and *Strophitus undulatus*) have spread into northern and western Manitoba or to eastern Saskatchewan; and one (*Lasmigona complanata*) has spread even through central Alberta to the Lake Athabasca drainage. All range expansions in this group have been northward and west-

ward, never eastward into the soft-water habitats of the Precambrian Shield. The varying degrees of success in penetrating colder regions may be related to threshold spawning requirements. In only two cases (*Ligumia recta* and *Strophitus undulatus*) does absence of the known fish host appear to be limiting.

Other Unionidae have used alternate invasion routes. *Elliptio complanatus* has penetrated the Hudson Bay Watershed only from the St. Lawrence System and is confined to that part of Ontario and Quebec east of Lake Nipigon and south of James Bay. It is uncommon or rare in this region, however, and competition with the abundant and nearby ubiquitous *Lampsilis radiata siliquoidea* may be a limiting factor. Two other species, *Lasmigona compressa* and *Anodontoides ferussacianus*, appear to have used dual invasion routes, one from Lake Superior through Lake Nipigon and Long Lac and one from the Mississippi-Missouri Basin through the Red River, but the distribution of neither species in the Hudson Bay Watershed appears to be correlated with bedrock geology or with temperature.

Anodonta grandis and *L. radiata siliquoidea* may have utilized multiple invasion routes. Both species occur throughout the entire boreal forest region even including the Mackenzie River north of Great Slave Lake. Summer water temperature data are desirable but unavailable. The northern limits of both species fall within the zone bounded by the 55° and 60°F. July average daily temperature isotherms, however, and are probably indirectly related to these average values.

(A projected map of Canada, of the geology of the region and slides of species followed by distribution maps illustrated Dr. Clarke's paper.)

President Burch: "This paper represents a great amount of painstaking work!"

* * *

With this, opening day's papers were brought to an end and the three hours before the scheduled evening assembly afforded the first opportunity to locate and sample the cuisine of one or another of the fine restaurants so plentiful in New Orleans. In this, home of the po' boy sandwich and where grits and red-eye gravy are as staple as bread and butter, the Northerners were intrigued by the variety of unfamiliar dishes. Perhaps most enjoyed was the abundance of fish and crustacea, never better than here, short hours away from their watery home.

* * *

At eight o'clock began an innovation which had been billed as Shell Club Night. Each of the thirty-two local shell clubs affiliated with the AMU had been invited to participate by sending delegates and an exhibit, a report of club activities, or other offerings of an instructive or entertaining nature.

Mr. and Mrs. Harvey Meyer acted as joint chairmen of the evening, doing a masterful job of correlating the varied material into a smooth-running and interesting program.

SHELL CLUB NIGHT

Spokesmen for the North Carolina Shell Club were Carl Withrow and James Wadsworth; it covers, said they, probably the largest geographical area of any club. Three meetings are held on the coast each year, the fourth inland.

Mrs. Betty Witt reported that the Philadelphia Club now has 225 members.

The New York Shell Club, said Marian Schroth, held a shell auction in April and \$500 was donated from the proceeds to the American Museum of Natural History to aid in financing a display of New York area shells.

The Gulf Coast Shell Club of Beaumont, Texas had no formal presentation, but two members in attendance were introduced. They, together with other club members, had prepared place favors for the annual dinner but they had unaccountably become lost in the mail.

The Connecticut Shell Club, the Connecticut Valley Shell Club, and the Rochester (N. Y.) Shell and Shore Club sent in written reports.

Mrs. Dorna Paxton Coley reported on behalf of the Pacific Northwest Shell Club which is now incorporated; they hope, said they, to invite the AMU to Seattle for the 1966 annual meeting.

Representing the National Capitol Shell Club, Dr. Tom Burch reported that proceeds of their first shell auction have been set aside to establish a scholarship fund to be awarded annually. (Further details on page 58.)

Myra Taylor of the San Antonio Shell Club noted that being 150 miles inland, little marine collecting is done by club members. However, she offered to introduce anyone traveling in the vicinity of San Antonio to the 15 varieties of mollusks in the Guadalupe River, or conduct them to several nearby fossil beds.

The Jacksonville Shell Club, said Mrs. Liz Eubanks, has assembled a reference collection of northeast Florida shells and put together exhibits for the Florida State Chamber of Commerce and the Children's Museum.

One of the newer clubs (two years) is the Broward Shell Club which holds meetings in South Pompano Beach, Florida; Mrs. Therese Marsh reported briefly on club activities.

Two other Florida clubs had mailed reports, the South Florida Shell Club of Miami and the Palm Beach County Shell Club of West Palm Beach: these were read by Mr. James Wadsworth.

William Reader reported for his St. Petersburg Shell Club that over the past year \$1,500 has been donated to Florida Presbyterian College to furnish a science classroom, this money was realized from annual shell shows.

The Sanibel-Captiva Shell Club, reported Mrs. Harvey Meyer, is now especially interested in conservation; 24,000 booklets have been distributed to tourists in which collecting and cleaning tips are interspersed with injunctions not to be a shell hog! Another club activity is the annual shell count or census.

The Conchological Club of Southern California had furnished two displays which were arranged on long tables. One of these was the work of Mrs. Twila Bratcher, a project whereby the blind are provided means of appreciation of the beauty of form and texture of shells. Shells were in compartmented boxes, each identified by a Braille label. The other was an impressive showing of the publications of club members.

Flanking these displays were two others, one made by the Boy's Club of Syracuse, N. Y. and furnished by Mr. Adlai B. Wheel, well known for his efforts in interesting children in the world of nature. The other was an assortment of beach shells from the Virgin Islands, brought by Mr. G. Usticke, who generously offered them to all interested "collectors." Needless to say, his offer was eagerly accepted.

The evening was concluded by two sets of slides, the first made by Mrs. Meyer and portraying the activities of Japanese pearl divers, the others, by Mrs. Dorothy Raeihle, were more or less candid studies of the small group who elected to collect marcasite fossils near Buffalo in 1963.

(The Secretary is indebted to Miss Marian Schroth for this accounting of Shell Club Night as well as for reporting on the bus field trip.)

* * *

Wednesday dawned bright and clear; at nine o'clock the first paper was introduced:

INDO-PACIFIC MOLLUSCA. R. Tucker Abbott, Academy of Natural Sciences of Philadelphia.

(Abstract)

The vast oceanic region of the Indian and tropical Western Pacific oceans is populated by a distinctive marine molluscan fauna which in some ways is uniform throughout, but which in some limited areas, such as the Bay of Bengal, the Red Sea, and the northwestern coast of Australia, shows a rather high degree of endemicy. Geographical and oceanographic factors have evidently influenced the distribution of the estimated 20,000 species of this region.

The journal *Indo-Pacific Mollusca*, published by the Department of Mollusks, is devoted to the Recent and Tertiary marine mollusks of this area. To date, the following groups have been taxonomically monographed: Vasiidae, Strombidae, Pinnidae, and Turridae. As of August 1964, there were 1,020 subscribers.

Dr. Abbott displayed a map encompassing the area covered by his publication and concluded with an outline of the journal's format, demonstrating the unique binding system.

President Burch: "Since so many of the South Pacific shells were described by the Sowerbys, I'm wondering how you avoid the inevitable confusion." Abbott: "We do attempt to offer complete author identity and have been especially careful in the Sowerby situation. But in the long run, I doubt that it makes too much difference if they do get mixed." Burch: "I get odd requests to identify bivalves of the South Pacific; since they were last covered by Reeve over a hundred years ago, I tell them to wait until Tucker Abbott gets around to their problem. Everybody at all interested in Pacific marine shells should subscribe to this publication."

MOLLUSCAN MAGNETISM. Lulu B. Seikman, St. Petersburg, Florida.

(Abstract)

Some European scientists stated recently that there seems to be some evidence of the presence of an internally produced electric field surrounding all objects, inanimate as well as living. If this is so, it might be of interest to investigate the phenomenon as it applies to the fields surrounding shell collectors and those surrounding the shells.

(Mrs. Seikman used a drawing of a simple magnetic field and a few shells to illustrate her paper.)

SOME HIGHLIGHTS IN THE STUDY OF MOLLUSKS ON THE
UNITED STATES GULF COAST. Gordon Gunter, Gulf Coast Marine
Laboratory, Ocean Springs, Mississippi.

(Abstract)

My reprint collection shows four times as many papers on the commercial oysters and clams of the northern Gulf as on the noncommercial molluscs. We are not concerned here with the commercial species.

In the last 35 years of the nineteenth century very little was done. Silas Stearns sent specimens to the National Museum from Pensacola and there was other desultory collecting. Dall published on a single Texas species in 1898. Vanatta in 1904 and L. R. Cary in 1906 mentioned a few species. J. D. Mitchell in 1894 attempted a list of Texas Mollusca.

George K. Strecker deposited a marine collection in the Baylor Museum in the early twentieth century and published some notes in 1935. The Louisiana State University Marine Laboratory was established at Grand Isle in 1926. H. W. Harry in 1942 published a list of the Grand Isle molluscs. This was repeated with additions by Behre in a faunal list in 1950.

In Texas there appeared faunal lists on the Nueces Bay area by Cross and Parks (1937), a handbook of Port Aransas shells by Parks, and a brochure on marine life in Texas waters by C. T. Reed (1941). The first two are compilations from Pratt's manual. I began work on the Texas coast in 1936 and Joel Hedgpeth joined me about 7 years later. Between us we wrote four papers with lists of molluscs, all of which were published around 1950. Harry Ladd came to Texas in 1940 and did his work on brackish-water and marine assemblages, which relied heavily on the molluscs. Following the war Robert H. Parker published several papers concerning the Texas coast and the mouth of the Mississippi. These works related present faunal distributions to geological features and they relied heavily on the molluscan fauna.

In 1946 the Institute of Marine Science of the University of Texas was established at Port Aransas and became a center of work and publication. Several more papers on the Laguna Madre and other parts of the Texas coast were published, listing the molluscan fauna. In 1952 Pulley's checklist of Texas marine molluscs was published. It is the first comprehensive account of that area. In 1955 Don Moore published a list of 15 unrecorded species from the Texas coast, and in 1961 he published his account of the marine and brackish-water Mollusca of Mississippi. Since that time specimens of *Mulinia* sp. and a small gastropod have been discovered in the waters of that state. Dr. E. A. Richmond of our laboratory has also published a paper on the flora and fauna of Horn Island, Mississippi. With regard to the molluscs it relies heavily on Moore's account. To the eastward Menzel and his associates at Florida State University have published faunal lists including the molluscs.

I am a little hazy about the status of collections of Gulf molluscs and this is a matter that should be investigated. Dr. Donald Moore and I have decided to make a more thorough investigation and appraisal of this whole historical situation. Thus, presumably, a more precise and extensive account of the history of molluscan studies of the northern and western Gulf will be forthcoming in future years.

RADULAE OF OTTAWA RIVER SNAILS. Maryl Weatherburn, Ottawa, Ontario, Canada.

(Abstract)

The radulae of freshwater snails vary greatly among specimens of a single species collected at one locality, as well as with that same species as described by Baker, Walker, and Tryon. Specimens of *Goniobasis livescens*, *Lymnaea stagnalis*, and *Stagnicola emarginata* showed variation in width of ribbon; *Goniobasis livescens* in number of cusps on all teeth; *Lymnaea stagnalis* and *Stagnicola emarginata* in formula; and *Helisoma trivolvis*, *Lymnaea stagnalis*, and *Stagnicola emarginata* in number of each type of tooth. An interesting discovery was a tricuspid first lateral in a *Lymnaea stagnalis* from an Ontario pond. In his book *The Fresh Water Mollusca of Wisconsin* Baker states that although some European papers mention such an occurrence, no American specimens have been found to have a tricuspid first lateral.

President Burch reminded Miss Weatherburn's audience that the third-year high school student had won a Canadian National Award for her scientific work. "Those working with radulae must all be impressed by your hard work and accomplishment!"

STUNTING OF *ONCOMELANIA FORMOSANA* IN CULTURE.¹ Henry van der Schalie and George Davis, University of Michigan, Ann Arbor, Michigan. Read by van der Schalie.

(Abstract)

The fact that pulmonate snails when grown under crowded conditions become stunted has been known for many years. Several detailed studies have been undertaken to attempt to explain this dwarfing in aquaria. The factors considered include noxious influences from accumulated wastes, production of pheromones, etc. However, no valid explanation has, as yet, been found. We have discovered that among the small operculate and amphibious snails in the genera *Pomatiopsis* and *Oncomelania*, which have been in culture in our laboratory for more than 8 years, there was a definite stunting or dwarfing among the snails raised in vivaria under conditions of crowding.

Oncomelania snails, which serve as intermediate hosts for human blood flukes (*Schistosoma japonicum*), have been cultured intensively for the past 2 years. They were raised in bell jars, clay saucers, plastic trays, petri dishes, etc. Careful measurements were kept on shell growth and whorl counts under conditions in which light, algal growth, and temperatures were measured. In the course of this work it was found that alternating light cycled to produce 150 footcandles of light for 8 to 10 hours per day yielded the best growing conditions. If more light is used the algae develop excessively so as to make the vivarium unsuitable for the young and growing snails. With an understanding of the optimum conditions in which light, algal growth, and temperature are controlled, tests were made on the growth of *Oncomelania formosana* under varying degrees of crowding.

Good culture conditions for young snails were obtained in 9-cm petri dishes maintained with proper soil and water conditions under cycled light. Two

¹ This work was sponsored by a contract with the U. S. Army Medical Research and Development Command (DA-49-007-MD-604) and by the Commission on Parasitic Diseases, Armed Forces Epidemiological Board.

such series were studied; the snails were raised under identical conditions but the number per dish varied from 1, 5, and 10 per dish. After 8 weeks all snails were measured, sexed, and the whorls were counted. It was found that the animals not only failed to grow to maximum size in the dishes where crowding occurred, but for each of the three series the number of whorls also decreased directly according to the number of snails per dish. Consequently, decreased size clearly indicated a decreased rate of growth. From calculations made from curves establishing what constitutes normal growth in this snail, it was possible to determine that one could not discover whether a snail was stunted or not without knowing the age of the snail. Data on growth and stunting are at present being compiled for publication.

In order to determine whether the stunted snails were capable of normal reproduction, series were taken from the three groups which showed different degrees of stunting. Serial sections of the gonads of each of these three groups clearly indicated that the stunted animals failed almost completely to develop their reproductive potential. Those raised for 8 weeks in petri dishes with 10 per dish were so poorly developed that one could hardly find any gonad tissue; those maintained at 5 per dish had the gonads only half developed; those held at 2 per dish were normal in growth and had almost mature or fully mature gonads. Males in this latter group are nearly always smaller than females. It was interesting to observe that mature sperm appear among males grown under optimum conditions while among females that had grown larger, the eggs were not quite fully mature.

The significance of this work is obvious to those who need these animals for studies of chemotherapy or mollusciciding where large numbers of snails are necessary and where one must have some information on the potentials for raising normal intermediate hosts. At present a paper is in preparation to provide the basic information obtained through these culture programs. It is now possible to predict the number of normal snails that can be produced in terms of cost for equipment and man-hours necessary, depending on the level of production needed.

(Slides which accompanied this paper pictured the laboratory aquarium, then graphs of growth rates as influenced by varying factors.)

THE COOSA RIVER AND ITS SHELLS. Herbert D. Athearn, Cleveland, Tennessee.

(Abstract)

The author showed slides of areas and specimens collected in the Coosa River drainage during the past two decades. The locales shown were on the Conasauga, Coosawattee, and Coosa rivers and on Choccolocco and other creeks.

It was pointed out that many of the best collecting areas have now disappeared. Much of the cause of this has been brought about by the inundating of the Coosa system by the construction of dams. The construction of a continuous series of dams on the Coosa from its mouth to Rome, Georgia is scheduled for completion by 1975. However, many of these have already been constructed or will be completed by 1965. The fine shoals just above Wetumpka at the mouth of Pigeonroost Creek will probably remain intact until the 1970's.

(Habitats and collecting sites were pictured together with some of the Gastropoda and Unionidae of the area.)

A recess until 7:00 P.M. was declared at this point and all present were requested to muster on the long stairway leading from the balcony to the lobby of the hotel. It was in this unusual setting that a group photograph was made (see page 36).

The afternoon was devoted to a bus tour of New Orleans and its environs. From the busy riverfront to Lake Pontchartrain, past antebellum mansions a-drip with vines; historical statuary, then more statuary in the old, old cemeteries; Tulane and Loyola universities and the Sugar Bowl; Jackson Square and the Cabildo; and, of course, the French Quarter, already well known to most of the delegates. It was, as one lady remarked as she alighted from the bus late in the afternoon, quite a ride.

To compensate for the afternoon's tour an evening session had been scheduled; at 7:00 P.M. the relentless gavel sounded as President Burch introduced the first paper:

TAREBIA GRANIFERA AND *MELANOIDES TUBERCULATA* IN TEXAS. Harold D. Murray, Trinity University, San Antonio, Texas.

(Abstract)

Tarebia (= *Thiara*) *granifera* and *Melanoides* (= *Thiara*) *tuberculata* are two species of Oriental snails that have been introduced into southern Texas. Both species of snails serve as intermediate hosts for human parasites in the Orient. *T. granifera* is an intermediate host for *Paragonimus westermani* (Oriental lung fluke) and *M. tuberculata* is an intermediate host for *Clonorchis sinensis* (Chinese liver fluke).

Established populations of both species occur in the San Antonio River, Bexar County, Texas, and a sparse population of *T. granifera* also occurs in Landa Park, New Braunfels, Comal County, Texas. One additional record of *T. granifera* is cited as Hillsborough County, Florida.

Inasmuch as both species of snails occur within and immediately outside the San Antonio Zoo and because both species occur in the river that traverses a large wooded park and the downtown metropolitan area, an intensive investigation will be undertaken to determine possible parasitic cycles between these snails and the fauna of the area. Preliminary studies have yielded negative results.

One of two effluents from the San Antonio Zoo maintains the largest population of both species found thus far; consequently, most studies originate from this area. In the effluent an average of 10 snails of both species occur per square centimeter.

The effluent is composed of two pools separated by a 30-cm waterfall. The upper pool (next to the zoo) varies in depth from 1 to 3.5 dm having a soft mud bottom. The lower pool varies in depth from 6 to 10 dm with a gravelly mud bottom. The average shell length of *T. granifera* reduces by one-half from the upper pool to the lower pool, and the change in size occurs at a 30-cm waterfall. The cause of the sudden change in shell length of *T. granifera* in an apparently contiguous population is not understood but is believed to be related to food from the zoo that settles in the upper pool.

Dissolved oxygen is inversely proportional to the size of *T. granifera* and, therefore, not considered significant.

Ecological associations, potential parasitic cycles, and life history studies of both species are presently being conducted.

(Dr. Murray's paper was well illustrated by projected area maps, charts of water depths, population density, food abundance, size of shell, etc.)

Clench: "Both species are now in southern Florida." Abbott: "How and where did *Melanoides* first start in this country?" Murray: "In trying to trace it back to one or another aquarium club I've talked to aquarium operators without much result." Dorothea Franzen: "Is there a chance of local snails getting infected and so start an epidemic?" Abbott: "No—because nobody in this country eats raw snails!"

ANATOMICAL RELATIONSHIPS IN THE TEREDINIDAE. Ruth D. Turner, Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts.

(Abstract)

The anatomy of the Teredinidae, though greatly modified and highly specialized, can be compared readily with that of other bivalves. In the Teredinidae, because of the proximity of the anterior and posterior adductor muscles, the visceral mass is extended posteriorly beyond the posterior adductor muscle in a long, narrow loop, the organs on the dorsal arm of the loop being upside down and backside to. The intestine opens over the posterior adductor muscle in the normal position. The visceral ganglion is situated at the posterior end of the pericardial cavity. During recent studies 32 species of teredinids were dissected, and it was found that a basic body plan is common throughout the family, but the variations on this plan are many and striking. These indicate the need for much additional physiological work in order to explain them. It appears now that the genera of this family can be arranged in six groups as follows:

Group I—*Kuphus* Guettard. Shell and adductor muscles reduced, heavy muscular collar just posterior to the shell; stomach posterior to the posterior adductor muscle, cecum lacking; intestine passing through ventricular bulb. Pallels solid in one piece.

Group II—*Bactronophorus*, *Neoteredo*, *Dicyathifer*, and *Teredothyra*. Stomach globular and anterior; intestine making a loop over the crystalline style sac; cecum present; intestine with conspicuous anal papillae; anal canal closed posteriorly; heart very long, pericardial cavity extending beneath the posterior adductor muscle. Pallels variable, but not segmentally structured and lacking awns.

Group III—*Teredora* and *Psiloteredo*. Stomach globular and anterior; intestine making a loop over the crystalline style sac; cecum moderate in size; intestine extending well down the anal canal and with a small or no anal papilla; anal canal not closed posteriorly. Heart anterior, but the pericardial cavity does not extend beneath the posterior adductor muscle. This group may have to be divided, for in *Teredora* the gills extend from

the siphons to the mouth, while *Psiloteredo* are typical of teredinids and the main portion of the gills extends only to the visceral mass. Pallets paddle-like, not segmentally structured, often with a thumbnail-like depression, with periostracal covering but lacking awns.

Group IV—*Lyrodus* and *Teredo*. Stomach elongate; intestine not making a loop over the crystalline style sac; cecum present; intestine not extending down the anal canal; feces in form of pellets; anal canal open posteriorly; young held in brood pouch above the gills until the late veliger stage. Pallets in one piece, not segmentally structured and with a pronounced periostracal cap in *Lyrodus*.

Group V—*Nototeredo*. Stomach globular and anterior; intestine making a loop over the crystalline style sac; cecum present; intestine extremely long and convoluted; intestine not extending down the anal canal; anal canal open posteriorly. Pallets appearing as one piece, but are segmentally structured and with lateral awns particularly in young specimens.

Group VI—*Spathoteredo*, *Nausitora*, and *Bankia*. Stomach elongate, extending well behind the posterior adductor muscle; intestine not extending down the anal canal; anal canal open. Pallets segmentally structured, with lateral awns, the segments becoming distinct cones in *Bankia*.

These groupings may have to be changed as more species in the various genera are studied, but at present there appear to be two main lines of evolutionary development: one with the pallets not segmentally structured and culminating in *Teredo* and *Lyrodus*, and the other with segmented pallets culminating in the genus *Bankia*.

(Anatomical drawings illustrated this paper.)

President Burch: "This was a most scholarly lecture. In the early days we used to find wood in San Pedro Bay that had been discarded by foreign ships; sometimes it contained *Teredo* differing markedly from our local species. Also, some of the agatized fossil wood collected along our northwestern shores shows *Teredo* holes."

THE EVOLUTION OF THE MESOGASTROPODA. Donald R. Moore,
Institute of Marine Science, University of Miami, Miami, Florida.

(Abstract)

The prosobranch gastropods are usually divided into three orders: Archaeogastropoda, Mesogastropoda, and Neogastropoda. The Prosobranchia first appeared in the Lower Cambrian, while the other two gastropod subclasses, the Opisthobranchia and the Pulmonata, appeared in the upper Paleozoic about 250 million years later. The orders are split into superfamilies and are generally arranged according to anatomical results discovered by zoologists.

Paleontologists generally attempt to fit fossil material into this zoological framework of classification. This has resulted in some anomalous reports with certain genera of mesogastropods occurring in strata older than the oldest age given for the order. To get around this, Cox (1960) stated, "There is every reason to believe that the Mesogastropoda arose polyphyletically."

Wenz (1938-1944) considered the three superfamilies, Littorinacea, Cerithiacea, and Naticaceae, to have been the earliest mesogastropods. Cox attempted to show a lineage leading from the Pleurotomariacea to the Cerithiacea. Other more archaic mesogastropod superfamilies were presumably derived from other groups of the Archaeogastropoda. He did not consider the close anatomical relationships of the various mesogastropod superfamilies, nor did he mention the taenioglossate radula of the vast majority of the mesogastropods. These resemblances most probably denote common ancestry. Thiele (1929-1931) and Fretter and Graham (1962) both agree that the Trochacea are the most likely ancestral group.

Minute marine gastropods show considerable differences in the ciliation of the head region and mantle cavity. This is due to the loss of the right ctenidium, and to changes in the ciliation of the cephalic tentacles. Neck lobes which act to direct respiratory currents are found in the Trochacea. Small Rissoacea have motile cilia extended out on the cephalic tentacles which set up a respiratory current. There are no neck lobes, but a pair of ciliated pallial tentacles, to aid mantle cavity respiration, may be present. The cephalic tentacles usually are tipped with long immobile cilia, and they are also scattered along the tentacle in some species. The Cerithiacea do not have pallial tentacles, and the cephalic tentacles are naked. The inhalent current is brought into the mantle cavity by cilia lining a siphonal fold. The Littorinacea have moved into brackish water or terrestrial environments, and have in some cases lost the osphradium or ctenidium. They do not have tentacular ciliation or a siphonal fold, but a published drawing of a very young postlarval *Littorina littorea* shows the cephalic tentacles covered with scattered immobile cilia. The Naticacea are much modified for plowing through sand and are probably at about the same level of advancement as the Littorinacea and the Cerithiacea. None of these three superfamilies appear to be particularly primitive, and the earliest mesogastropods should be looked for elsewhere.

It is here proposed that the probable chain of events was as follows. A group of small trochid-like gastropods moved into fresh water during the Middle Paleozoic. In quiet poorly oxygenated fresh water they modified the sensory cilia on the cephalic tentacles to provide an auxiliary respiratory current past the entire body of the snail. Part of this group spread into the sea and became the modern Rissoacea. From this superfamily, two divergent lines of evolution were developed. Those that largely retained tentacular ciliation are the Pyramidellacea, the Aglossa, and probably the Ptenoglossa. The other line includes the majority of mesogastropods that usually have a siphonal fold and ultimately lead to the Neogastropoda.

Of all the Trochacea, the Skeneidae seem to be the most probable ancestral type. One species observed by the writer had the tentacles densely covered by immobile cilia. There were no neck lobes; instead, ciliated tentacles on each side of the neck helped to propel a respiratory current. This, along with a reduced number of marginal teeth in the radula and a nonnacreous shell, appears to set the skeneids off from the Trochacea. The writer is of the opinion that the skeneids should form another superfamily, the Skeneacea, and that they are the group from which the Mesogastropoda have sprung.

(Accompanied by projected charts showing geologic order.)

Wednesday's program was terminated with this paper. Thursday was given over entirely to field trips and the annual dinner.

Two field trips had been arranged by the indefatigable Dundees. Both started from the hotel at 9:30 in chartered buses, one bound for a 160-mile circuit of the bayou country where land and marine mollusks might—with luck—be collected, the other transported those who chose to dredge brackish-water species to a dock on the southern shore of Lake Pontchartrain.

It was late afternoon before both parties were back. The bus trip had afforded only the most common of littoral mollusks (*Littorina*, *Neritina*, *Melampus*) but was rewarding in that all who took it gained added insight into the geography, geology, and fauna of this unique bit of the United States, thanks to the instruction of guide Harold Dundee who, equipped with megaphone, had pointed out features which would otherwise have been overlooked.

Dredging from two boats furnished by the Louisiana Fish and Wildlife Service under the direction of Dr. Joseph Morrison and Dr. Arthur Merrill was little more rewarding, dredge hauls being restricted almost entirely to *Rangia cuneata*. An afternoon squall provided a choppy return trip, spiced by the radio report of a capsized sailboat which was not sighted.

* * *

The annual dinner provides the one bit of formality enjoyed by this informal organization. It was with anticipation that the evening trek was made to Arnaud's in the French Quarter, a famed restaurant whose food is as fabulous as the outside is unprepossessing.

Following a brief social hour, diners found places at long tables decorated with flowers and individual favors consisting of specimens of the lovely *Cypraea spadicea*, California's only cowry, these the gift of President John Q. Burch, and a rolled set of six lithographs picturing the most colorful shells of Australia. These were issued by the Shell Oil Company of Australia and furnished for the occasion by Mr. John B. Saxby of San Francisco.

The first course of the banquet yielded still another souvenir; the drab shells of the *oysters Rockefeller* went back to the kitchen but the huge and colorful shells of *Helix leucorum* (*escargot*) were as attractive as the contents were tasty, and once emptied they went into purses or pockets.

An hour later, the feast of *chicken meunière* and *trout amandine* now a memory, the assemblage settled back with the demitasse as President Burch rose to speak.

He introduced the past presidents and their ladies, the AMU Secretary, the AMU Vice-President, his own son Dr. Tom Burch, and finally the Dundees and their helpers who had worked so tirelessly to bring about the successful meeting.

He then made a few remarks which he called "My First and Worst Lecture to the Neophyte Malacologist."

Explaining that as each trade has its jargon, so too does the science of malacology, mellowed by tradition, unaffected by logic. Never, said he, resort to simple English. A scientific name should be a compound word which no one can pronounce, understand, or spell. "New genus" refers to a shell one has not seen before while "new species" is a delightful term applicable to simply any shell that comes to hand. If you mention that the only specimen known is the holotype, be sure to add "extremely rare." Röding is a convenient author reference when you are not quite sure. Any unidentifiable 16th- or 17th-century woodcut may be attributed to this very talented fellow! When

discussing a shell, the word "defect" must always be preceded by "very minor," and all characters identical with those of another species are always "faint."

President Burch concluded his tongue-in-cheek advice with the charge to make frequent use of the statement, "Unrecorded in Tryon, Sowerby, Reeve, or Kiener. This makes your shell sound rare and gives the impression that you have a vast reference library available." Unless, said he, you are dealing with a land shell, "Not in Pilsbry" are the magic words to use in this case!

As the laughter engendered by this bit of satire died away, Mr. Jim Wadsworth of the North Carolina Shell Club asked to be heard.

He wished, said he, to read from the local newspaper a few of the recent news items regarding the antics of AMU delegates. Needless to say his pseudo-squibs were highly imaginary and received with great enjoyment by his audience.

Mr. Burch then introduced the featured speaker of the evening, Dr. William J. Clench, Curator of Mollusks at the Museum of Comparative Zoology, Harvard University.

Dr. Clench did not title his remarks but reminisced on one or another phase of the collecting experiences of over half a century. He touched upon the vanishing habitats, a subject dear to his heart; told of collecting in the Florida Everglades when the Tamiami Trail was being constructed and the *Liguus* were plentiful on every hammock; and gave delightful thumbnail sketches of many of his collecting companions. Altogether it was an enjoyable half hour and over all too quickly.

Dr. Thomas Pully rose to present to Dr. Clench, on behalf of his many admirers (who had earlier affixed their autographs), a perfect specimen of what was promptly dubbed *Cassis horridus* var. *hideosus*! Untastefully and lavishly embellished with pink and green luminous paint, it represented the very worst of the shell decorator's art. Well-nigh overcome, Dr. Clench promised to cherish it forever.

* * *

Friday ushered in a full day of papers with a midday break for the annual business meeting.

DISC ELECTROPHORESIS IN THE STUDY OF MOLLUSCAN SYSTEMATICS.¹ George M. Davis and Gene Lindsay, University of Michigan, Ann Arbor, Michigan. Read by Gene Lindsay.

(Abstract)

Proteins are genetically determined structural elements of the body. A species is defined, in part, by its distinct genetic composition apart from the genetic composition of other species. It is reasonable that genetic divergence between species would be displayed in a divergence of protein composition.

Disc electrophoresis was used to separate foot muscle proteins. This technique was used because of its increased efficiency over other techniques in separating small quantities of protein. Foot muscle tissue was utilized because it was:

- 1. an organ characteristic of the phylum,**
- 2. it was more readily obtained from small mollusks than was blood,**

¹ This work was supported by a contract with the U. S. Army Medical Research and Development Command and sponsored by the Commission on Parasitic Diseases, Armed Forces Epidemiological Board.

3. it was a tissue most often free from parasites and could be easily inspected for parasites,
4. compared to fractionating the whole snail, the foot represents a relatively homogeneous tissue.

Standards for the linear arrangement of protein fractions and density were established for each tissue or serum analyzed. Against this background of standards it was determined that the "fingerprint" of one species was distinctly different from that of any other species. This was determined after analyzing hundreds of specimens of numerous species in the lymnaeid and hydrobiid families.

Foot muscle proteins and blood from numerous *Helix pomatia* were studied. These snails varied from 8 to 41 mm in height. Qualitative and quantitative results were correlated with size. Analyzing the foot muscle, it was found that there was no significant qualitative or quantitative difference in the 19 separated protein components between individuals of the same population. Seven protein components were separated from the blood. The position of these components remained constant, but as the individuals increased from 8 to 13 mm in height, the protein density decreased from 50 to 33 units. As the individuals grew from 20 to 41 mm, the density decreased from 23 to 12 units.

These results indicate that growth and the accompanying physiological changes only affected the blood protein density and that the linear sequence of proteins of both foot muscle and blood were reliable characteristics for a population of a species. As no differences were found between individuals of a population using foot muscle in the investigation of small or minute species, the foot muscle was pooled from several specimens.

Disc electrophoresis is sensitive enough to demonstrate variation between populations of a species. Three distinct populations of *Oncomelania formosana* from Taiwan were studied. The anatomy of specimens from these populations was identical. The "fingerprint" patterns of two of the populations were identical while that of the third differed in two of the protein components. This difference was constant. The electrophoretic difference was attributed to slight genetic divergence in a geographically isolated population.

Distinct species have distinct patterns, not patterns where many fractions appear homologous as in the subspecific variation discussed above.

Franzen: "Were you using laboratory animals exclusively? For it would seem that variations in locality and habitat conditions would affect your findings." Lindsay: "We use snails both from our lab and from the field. And in the case of field snails we make certain studies to tie in. There is a change; it's small but constant."

THE CHROMOSOME CYCLE IN THE LAND SNAIL *CATINELLA VERMETA* (SAY).¹ C. M. Patterson, University of Michigan, Ann Arbor, Michigan. Read by Robert Wakefield.

(Abstract)

At least two members of the genus *Catinella* are unique among the Stylomatophora because of their low chromosome numbers (*C. rotundata* of Ha-

¹ This investigation was supported (in part) by research grants 2 T1 AI 41-06A1 from the National Institute of Allergy and Infectious Diseases, U. S. Public Health Service, and GB-787 from the National Science Foundation, Washington, D. C.

waii, $n = 5$, $2n = 10$ and *C. vermeta* of the continental U.S.A., $n = 6$, $2n = 12$). Having these low chromosome numbers, these species are therefore particularly well suited for a complete study of the chromosome cycle during spermatogenesis.

Catinella vermeta is a common, widely distributed species in which gametogenesis can be found occurring in almost any individual at any time. Its early mitotic prophase chromosomes appear as rather fuzzy, diffuse strands with extremely irregular margins. These strands are rather long with darker staining (with acetic orcein) sections along their length. The mid-prophase chromosomes are somewhat shorter in length, more deeply stained, and have smoother margins. The coiled nature of the strands is particularly evident. The area of the centromere appears as a lightly stained or nonstained portion of each strand. In late prophase, the chromosomes are even more condensed and deeply stained. They are shorter in length and have even smoother margins. Differential staining of the centromeric regions is not as clear as in mid-prophase, but constrictions indicate the centric area in some chromosomes.

Metaphase chromosomes are greatly contracted and deeply stained. They have smooth margins, and the coiled structure is not apparent. The centromeric regions are indicated only by constrictions and are located at the "bend" of the chromosomes where the centromeres are attached to the spindle, thereby forming V-shaped figures in those chromosomes with medianly located centromeres. Anaphase chromosomes have much the same shape, size, and density of stain as in the preceding metaphase. The chromosomes become more tightly grouped within the nucleus during late telophase to resemble a rather solid ball of chromatin.

After the last premeiotic division the nucleus enlarges to form the first meiotic prophase nucleus with its leptotene chromosomes appearing as maximally extended single strands. These strands are lightly stained with more darkly stained, bead-like chromomeres along their length. The free ends of the chromosomes show the polarization characteristic of the "bouquet stage." The separate homologues can still be discerned during zygonema; pairing seems to be chromomere for chromomere along the length of the homologous strands. These chromosomes are somewhat shorter in length and more densely stained than leptotene chromosomes. Pachytene chromosomes are still shorter and much more densely stained. The longitudinal doubleness of the strands can no longer be discerned and they appear to have a homogeneous consistency with the margins rather smooth in outline. The chromosomes of diplonema appear diffuse, poorly stained, and with irregularly characterized margins. Homologues begin to repel one another, causing a separation so that the chromosomes have open areas or loops along their length. The homologues remain connected at the points of crossing-over (chiasmata). As terminalization begins and contraction continues, the chromosomes soon form the ring, rod, cross, or multiple loop-shaped figures characteristic of diakinesis. In early diakinesis, the chromosomes are still quite diffuse and lightly stained, but by late diakinesis they appear as smaller and more deeply stained figures.

Metaphase I bivalents are very condensed and deeply stained with smooth marginal outlines. The bivalents form either ring, half-ring, or rod-shaped figures in polar view, depending upon the number and location of chiasmata.

Homologous centromeres, with their chromatids, separate at Anaphase I. The chromosomes in each anaphasic group are about one-half the size of Metaphase I bivalents. The centromeric regions can be identified as constrictions. Following cytokinesis, the chromosomes seem to immediately enter the second meiotic division without undergoing an observable period of interkinesis.

During Prometaphase II the dyads begin to move toward the equator of the cell. They seem to be somewhat more contracted than in the previous anaphase. The chromosomes of Metaphase II are even more contracted, are densely stained, and have smooth marginal outlines. During Anaphase II each dyad separates to form two monads or daughter chromosomes which pass to opposite poles. When the chromosomes reach their respective poles, Telophase II is initiated and cytokinesis occurs. There is one large chromosome and five smaller chromosomes randomly oriented within the nucleus. The chromosomes then enter an interphase-like state with the chromatin becoming characteristically diffuse and irregular in shape. Young spermatids are then formed, each having a conspicuous nuclear membrane.

(Slides of Miss Patterson's microscopic chromosome studies were projected.)

CYTOLOGICAL STUDIES OF THE OPISTHBRANCH MOLLUSKS.¹

Rajah Gopala Natarajan, University of Michigan, Ann Arbor, Michigan.

(Abstract)

In recent years, detailed investigations have been made on the chromosomes of basommatophoran and stylommatophoran mollusks, but few opisthobranchs have been studied, partly because of the difficulties they present in collection and identification. Makino (1956) has listed the chromosome numbers of 16 species of opisthobranchs, but the work of Inaba and Hirota (1958), Inaba (1959, 1961), and our studies at the University of Michigan show that the earlier records are not reliable. The Japanese authors deal with 26 species of opisthobranchs belonging to 18 families and 6 orders, revealing the prevailing cytological conditions in these various orders. Nevertheless, there is need for further studies on the chromosomes of opisthobranchiate mollusks since relatively few species have been studied in this large group.

The present investigation deals with the chromosomes of ten species of opisthobranchs from three islands of the Eniwetok Atoll in the South Pacific. The species studied presently include three species of the order Nudibranchia, two species of the order Anaspidea, four species of the order Cephalaspidea, and one species of Soleolifera. In the Nudibranchia the three species studied all had 13 pairs of chromosomes. This was the only number found for 16 other species of nudibranchs belonging to 8 families studied by Inaba, and Inaba and Kirota, pointing to a striking conservatism in chromosome numbers in this order.

Recently, Inaba (1961), in discussing the cytotaxonomy of mollusks, has pointed out that cytologically, Thiele's (1931) and Boettger's (1954) systems of classification and phylogeny of opisthobranchs seem to be more valid than that of Odhner's (1939). However, Burch (1964) has expressed the opinion that from a cytological viewpoint, the order Nudibranchia with a haploid

¹ This investigation was supported (in part) by a research grant (GB-787) from the National Science Foundation, Washington, D. C.

number of 13 might be considered as one of the more primitive opisthobranch groups since the general evolutionary trend in mollusks is towards an increase in the number of chromosomes rather than a decrease. Also, on anatomical grounds, some European malacologists consider the Nudibranchia to be one of the primitive opisthobranch groups. Therefore, it would seem that perhaps a reevaluation of current concepts of the phylogeny of the opisthobranch orders is desirable. It must also be pointed out that there exists a gap between the groups Notaspidea and Nudibranchia on the one hand, with a haploid chromosome number of 12 or 13, and the orders Sacoglossa, Anaspidea, Entomotaeniata, Cephalaspidea, and Soleolifera, on the other hand, where the haploid numbers are 16, 17, and 18.

In the Anaspidea only two species of the family Aplysiidae have been studied previously; both had 17 pairs of chromosomes. In the present study two more species of the same family also were found to have that same number. In the Cephalaspidea, two species of the Atyidae were found to have a haploid chromosome number of 17 whereas two species of the Philinidae had a haploid number 18. The occurrence of the haploid chromosome number of 18 in the order Cephalaspidea is very interesting and perhaps may prove to be significant. It would seem to strengthen Pelseneer's and Boettger's views regarding the origin of Basommatophora from Cephalaspidea, since the haploid chromosome number of 18 is basic for the Basommatophora.

In the Soleolifera the one species of the family Onchidiidae that we studied also had a haploid chromosome number of 18. The haploid number 18 has been recorded previously in only one member of the order Soleolifera. Other members of this order show chromosome numbers of 16 and 17.

(A most interesting series of slides depicting collecting conditions on Eniwetok Atoll accompanied this paper; the author also employed tables of his microscopic studies.)

President Burch: "I'm constantly amazed at the amount of work these young people are putting into their studies!"

NOTES ON THE SEX OF *CAMPELOMA*. Henry van der Schalie, University Museums, University of Michigan, Ann Arbor, Michigan.

(Abstract)

In November 1963 a series of large *Campeloma*, which appear to be *Campeloma ponderosum coarctatum* (Lea) as designated by Bryant Walker (1915), were found at the mouth of Birdsong Creek as it enters Kentucky Lake above New Johnsonville, Tennessee. It was not until this series of 34 specimens was examined later that the sex ratio was found to be half males and half females. Those who collect *Campeloma* throughout northern regions so seldom see a male that it seemed worthwhile to prepare figures of both the males and females of this series.

The rarity of males is evident from reports in the literature. H. J. Van Cleave and Dorothy Altringer (1937) in their study of the life history of *Campeloma rufum* sampled for 4 years and examined over 1,500 specimens without ever seeing a male; Norman Mattox (1938) in his paper on the morphology of the same species carefully studied 750 specimens mostly from Illinois but he also examined specimens from Kentucky and Wisconsin, without ever finding a male; J. C. Medcof (1940) in his report of *Campeloma decisum* in the Speed River of Ontario studied the genitalia of 450 specimens

without encountering a male. All of these observations reinforce the significance of the studies of Norman Mattox, who indicated that the *Campeloma* throughout the northern regions of the United States is parthenogenetic.

While the anatomy of *Campeloma* has been known since 1865 when R. E. Call figured both male and female genital systems, good figures of male genitalia are difficult to find. One of the best was published by F. C. Baker (1928) for *Campeloma integrum*. It was this figure which served to convince local parasitologists in the late thirties and early forties, while they were working with a common metacercarium of *Leucochloridiomorpha constantiae* Mueller in the uterus of *Campeloma*, that this genus does have species with males. However, among the many thousands of specimens they examined they never found one. The figures which were shown at the recent meetings to illustrate the gross anatomy of *Campeloma ponderosum coarctatum* (Lea) will be published later.

Among the males examined it was of interest to find that the verges were by no means similar. In the forthcoming publication several of them will be illustrated to show this wide range of variation. It has recently become a matter of concern that among the specimens studied and labeled as females on the basis of the normal structure of the right tentacle, some of them when sectioned turned out to have the gonads of males. While the modification of the right tentacle to serve as a verge is definite, the question as to its value in species differentiation remains an open question. Serial sections of females show a large storage sac, presumably a spermatheca, filled with sperm, indicating that transfer is successfully accomplished. At present, specimens with normal right tentacles are being sectioned to determine whether there are males without the usual enlarged right tentacle which serves as a verge.

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(A few slides picturing locality, then a projected map and anatomical drawings illustrated this paper.)

Morrison: "Is it possible you may have some *Campeloma crassa* mixed in there?" Van der Schalie: "It may be, but we went under the assumption that all were *ponderosa*; it's really very hard to distinguish since the characteristics are so variable."

THE MUSSEL (MUSCLE) SHOALS OF THE TENNESSEE RIVER RE-VISITED. David H. Stansbery, The Ohio State Museum, and The Ohio State University, Columbus, Ohio. X

(Abstract)

The Mussel Shoals of the Tennessee River, now inundated behind Wilson Dam, have long been famous for the abundance and especially the variety of naiads living there. Ortmann (1924) noted that "there is no other place upon the whole wide world which could be compared with this one in this respect" and he later (1925) listed 69 species and varieties as positively identified from this locality. This remarkable assemblage is apparently due to the coming together of the Cumberlandian Fauna from the Southern Appalachians with the Ohioan Fauna from the Interior Basin in a very favorable environment.

Using today's nomenclature, ignoring subspecies of the same species, and adding one species not included by Ortmann, the list contains 22 Cumberlandian, 15 Ohioan, and 26 unassigned species—63 species in all.

Extensive collecting of the lower Mussel Shoals region below Wilson Dam during August 1963, has made possible a comparison of the original naiad fauna with that of today.

The Naiad Fauna of the Mussel Shoals of the Tennessee River
of Northern Alabama

C—Cumberlandian origin

P—Previously recorded

O—Ohioan origin

(Ortmann, 1925)

U—Undetermined origin

R—Recently recorded

(Stansbery, 1963)

	Origin	Recorded
1. <i>Cumberlandia monodonta</i> (Say)	U	P
2. <i>Fusconaia ebena</i> (Lea)	O	P, R
3. <i>Fusconaia subrotunda</i> (Lea)	U	P, R
4. <i>Fusconaia cuneolus</i> (Lea)	C	P
5. <i>Fusconaia edgariana</i> (Lea)	C	P
6. <i>Fusconaia barnesiana</i> (Lea)	C	P
7. <i>Megaloniais gigantea</i> (Barnes)	O	P, R
8. <i>Amblema plicata</i> (Say)	U	P, R
9. <i>Quadrula quadrula</i> (Rafinesque)	O	P, R
10. <i>Quadrula pustulosa</i> (Lea)	U	P, R
11. <i>Quadrula cylindrica</i> (Say)	U	P
12. <i>Quadrula metanevra</i> (Rafinesque)	O	P, R
13. <i>Quadrula intermedia</i> (Conrad)	C	P
14. <i>Tritogonia verrucosa</i> (Rafinesque)	U	P, R
15. <i>Cyclonaias tuberculata</i> (Rafinesque)	U	P, R
16. <i>Plethobasus cyphus</i> (Rafinesque)	U	P, R
17. <i>Plethobasus cooperianus</i> (Lea)	O	R
18. <i>Plethobasus cicatricosus</i> (Say)	O	R
19. <i>Lexingtonia dolabelloides</i> (Lea)	O	R
20. <i>Pleurobema cordatum</i> (Rafinesque)	U	P, R
21. <i>Pleurobema clava</i> (Lamarck)	O	P
22. <i>Pleurobema oviforme</i> (Conrad)	C	P, R
23. <i>Elliptio crassidens</i> (Lamarck)	U	P, R
24. <i>Elliptio dilatatus</i> (Rafinesque)	U	P, R
25. <i>Lastena lata</i> (Rafinesque)	U	P
26. <i>Lasmigona costata</i> (Rafinesque)	U	P
27. <i>Anodonta grandis</i> Say	O	R

28. <i>Anodonta suborbiculata</i> Say	O	R
29. <i>Strophitus undulatus</i> (Say)	U	P
30. <i>Ptychobranchnus fasciolaris</i> (Rafinesque)	U	P, R
31. <i>Ptychobranchnus subtentum</i> (Say)	C	P
32. <i>Obliquaria reflexa</i> Rafinesque	U	P, R
33. <i>Cyprogenia irrorata</i> (Lea)	U	P, R
34. <i>Dromus dromas</i> (Lea)	C	P
35. <i>Obovaria retusa</i> (Lamarck)	O	P
36. <i>Obovaria olivaria</i> (Rafinesque)	O	P, R
37. <i>Actinonaias carinata</i> (Barnes)	U	P
38. <i>Actinonaias pectorosa</i> (Conrad)	C	P
39. <i>Truncilla truncata</i> Rafinesque	O	P
40. <i>Truncilla donaciformis</i> (Lea)	O	P
41. <i>Plagiola lineolata</i> (Rafinesque)	O	P, R
42. <i>Leptodea leptodon</i> (Rafinesque)	U	P
43. <i>Leptodea fragilis</i> (Rafinesque)	U	P
44. <i>Proptera alata</i> (Say)	U	P, R
45. <i>Proptera laevis</i> (Lea)	O	R
46. <i>Conradilla caelata</i> (Conrad)	C	P
47. <i>Medionidus conradicus</i> (Lea)	C	P
48. <i>Villosa trabilis</i> (Conrad)	C	P
49. <i>Villosa nebulosa</i> (Conrad)	C	P
50. <i>Villosa taeniata</i> (Conrad)	C	P
51. <i>Villosa vanuxemensis</i> (Lea)	C	P
52. <i>Ligumia recta</i> (Lamarck)	U	P, R
53. <i>Lampsilis virescens</i> (Lea)	C	P
54. <i>Lampsilis anodontoides</i> (Lea)	O	P, R
55. <i>Lampsilis ovata</i> (Say)	U	P, R
56. <i>Lampsilis fasciola</i> Rafinesque	U	P
57. <i>Lampsilis orbiculata</i> (Hildreth)	O	P, R
58. <i>Dysnomia triquetra</i> (Rafinesque)	U	P
59. <i>Dysnomia brevidens</i> (Lea)	C	P
60. <i>Dysnomia sulcata</i> (Lea)	O	P
61. <i>Dysnomia haysiana</i> (Lea)	C	P
62. <i>Dysnomia personata</i> (Say)	O	P
63. <i>Dysnomia biemarginata</i> (Lea)	C	P
64. <i>Dysnomia turgidula</i> (Lea)	C	P
65. <i>Dysnomia florentina</i> (Lea)	C	P
66. <i>Dysnomia capsaeformis</i> (Lea)	C	P
67. <i>Dysnomia torulosa</i> (Rafinesque)	U	P
68. <i>Dysnomia arcaeformis</i> (Lea)	C	P*

* Omitted by Ortmann (1925).

Summary

	Previously recorded	Recently recorded
Cumberlandian species	22	2
Ohioan species	15	14
Unassigned species	26	14
	63	30

There seems little doubt but that the Cumberlandian species are the most susceptible to the changes which have occurred and that the Ohioan species are the most resistant.

The only two Cumberlandian species recently taken are represented by only two specimens each. If these specimens are, as seems highly probable, chance introductions into the area, then there are today no reproducing populations of any Cumberlandian species in the Mussel Shoals area. It appears that Ortmann's concern that this unique fauna might gradually disappear with the effect of the dam and increased pollution is being rapidly realized.

(Accompanied by slides showing habitat, John boats, Indian middens, etc.)

Glench: "Have you made analysis as to shoal vs. deep-water species?" Stansbery: "Yes, and found the shallow-water species mainly gone, the deep-water species living still." Glench: "Also, I imagine the fish hosts are gone. In 1840 when Anthony made his famous trip the Indians used to cross the river where the dam is today."

CYTOTAXONOMY OF THE GENUS *ONCOMELANIA*, INTERMEDIATE HOST OF *SCHISTOSOMA JAPONICA*.^{1, 2} John B. Burch, Museum and Department of Zoology, University of Michigan, Ann Arbor, Michigan.

(Abstract)

There have been several different and quite diverse opinions concerning systematics of the snail vectors of Oriental human schistosomiasis, and especially the number of taxa which comprise the group. The most extreme view to the side of the "splitters" is that of Bartsch (1936, 1939, 1946), where the genus *Oncomelania* of other authors was divided into three genera, *Oncomelania* retained for *O. hupensis* Gredler, and including *O. möellendorffi*, *O. longiscata*, *O. elongata*, *O. schmackeri*, *O. multicosta*, *O. costulata*, *O. crassa*, and *O. yaoi*; the genus *Katayama* retained for *Katayama nosophora* Robson, and including "*Katayama*" *nosophora yoshidae*, "*K.*" *formosana*, "*K.*" *lii*, "*K.*" *fausti*, "*K.*" *cantoni*, and "*K.*" *tangi*; and the genus *Schistosomophora* described as a new taxon to include *Prososthenia quadrasi* Möellendorff and "*S.*" *minima*, "*S.*" *robertsoni*, and "*S.*" *slatteri*. In this scheme, the vectors of Oriental schistosomiasis and allied species consisted of 3 genera, 19 species, and 2 subspecies.

Abbott (1948) considered the group to consist of only one genus, *Oncomelania*, and this genus to contain only four species, one of which had an additional variety, *O. hupensis slatteri*. *Oncomelania nosophora* was believed to occur in Japan and the China mainland; *O. hupensis* inhabited the China mainland; *O. formosana* was found on Formosa; and *O. quadrasi* was found in the Philippines. Yuan-Hua and Shou-Pai (1957) went even further and presented the opinion that "... the specific term *Oncomelania hupensis* Gredler should be used for all *Oncomelania* snails involved in the transmission

¹ Contribution No. 4, Intermediate Hosts of Schistosomiasis Program, Institute of Malacology. This work was done in cooperation with the 406 Medical Laboratory, U. S. Army Medical Command, Japan.

² This investigation was supported (in part) by a Public Health Service research career program award (number 1-K3-AI-19, 451-01) and by research grants 2 T1 AI 41-06A1 from the National Institute of Allergy and Infectious Diseases, U. S. Public Health Service, and GB-787 from the National Science Foundation, Washington, D. C., U.S.A. This work was sponsored (in part) by the Commission on Parasitic Diseases of the Armed Forces Epidemiological Board and was supported (in part) by the U. S. Army Medical Research and Development Command.

of schistosomiasis japonica in China." Also, they rejected the validity of the variety *slatteri*.

Burch (1960) determined the chromosome numbers of these four "species." They all have the same chromosome number, $n = 17$, $2n = 34$, which is interesting, but not much help from a standpoint of taxonomy (except when contrasted with the fact that the two Michigan species of the closely related *Pomatiopsis* each have a different chromosome number). The present investigation deals with the chromosomes of hybrids of the four "species" of *Oncomelania*.

A study of the chromosomes of snails of known hybrid origin has previously never been pursued with any mollusk. One might expect that such a study would give extremely valuable clues as to the relationships of the species involved. Such an assumption is based on the fact that homologous chromosomes pair at meiosis, and nonhomologous chromosomes, or non-homologous segments of chromosomes, do not normally pair. Therefore, the more distantly related species might be expected to have more nonpairing chromosomes and more closely related species to have fewer nonpairing chromosomes.

A careful examination of late prophase or diakinesis chromosomes of the various F_1 hybrids of the four *Oncomelania* "species" revealed no apparent anomalies that did not also occur as prevalent in the normal parents. Only normal bivalents with one, two, or three chiasmata were observed, and no univalents, trivalents, or quadrivalents were found. In addition, all segments of each chromosome seemed to pair completely. When this information is coupled with the great ease of hybridizing the various so-called "species" and the nonreduced viability of the hybrids, then grounds for a different interpretation of systematics in *Oncomelania* are available. This interpretation is that the four so-called "species" of *Oncomelania* are no more than geographical populations or races of the same species. Such an interpretation is compatible with what is known about the morphology of the geographic populations, since distinguishing differences between the four are slight. In fact, on shell shape, *Oncomelania nosophora*, *Oncomelania formosana*, and *Oncomelania quadrasi* form a north to south step-cline, the Japanese species being relatively long and slender, the Philippine species being relatively shorter and broader, and the Formosan species falling between the two extremes.

Therefore, if one uses reproductive isolation (including chromosomal homology) as a main criterion for determining which populations are distinct species and which are not, then in the case of *Oncomelania*, what a few years back were considered 3 genera, 19 species, and 2 subspecies are in reality no more than one species with several geographical races.

(Dr. Burch employed projected charts and lists of the species involved to illustrate his paper.)

GASTROPODS IN SCIENTIFIC RESEARCH. Albert R. Mead, University of Arizona, Tucson, Arizona. (Read by title.)

(Abstract)

All biology, including malacology, is currently in a remarkable state of evolution, growth, and change. The classicists in our ranks, i.e., those who are

concerned with the more classical aspects of malacology (taxonomy, phylogeny, faunistics, zoogeography, paleontology), have viewed with a certain amount of justifiable alarm the headlong plunge of some research and teaching groups into the so-called "modern biology" or "molecular biology." The investigators in this latter group are preoccupied with the biochemical and biophysical phases of life; and in some notable cases there has been regrettable unfortunate confusion of otherwise excellent research through the fact that insufficient care was taken initially to identify taxonomically the experimental animals. Conversely, the "old guard" taxonomists have insisted that time-tested, standard criteria for identifying mollusks are generally quite adequate and that they cannot be expected to develop an effective utilization of some of the more sophisticated techniques in, e.g., cytogenetics and chromatographic methods, irrespective of the potential value to taxonomic interpretation. It is more than apparent at this time that neither group can any longer ignore or replace the other. Instead, the two groups must work together toward a wholistic approach to a fuller and better understanding of the relationships and biology of a tremendously important, but relatively neglected group of animals—the mollusks. Terrestrial gastropods, in particular, lend themselves well to scientific investigation; and when this fact is fully appreciated, it is predictable that they will form the basis of important new concepts in biology. These animals are easily collected and maintained; they can tolerate an amazing amount of neglect; some can go for years without food or water; substantial portions of the body, e.g., the entire head, can be regenerated after amputation; vital organs can be reached through "windows" cut in the shell; over 50% of the blood can be drawn off with little apparent effect on the snail; diseases of snails are just beginning to be discovered; the culture of snail tissue is currently being successfully developed in this country (at the University of Arizona and the University of Michigan) and in Europe; and the phenomena of estivation and hibernation, with their important physiological implications, have yet to be understood. Greater effort should be exerted by the zoologist to encourage the young, undecided student of biology to go into the field of malacology, irrespective of whether he is taxonomically or physiologically inclined.

CELL AND TISSUE CULTURE OF MOLLUSKS. Catalina Cuadros and John B. Burch, University of Michigan, Ann Arbor, Michigan. (Read by title.)

With these last two papers whose authors were not present to read them, at midafternoon the academic sessions of the thirtieth annual meeting came to an end. The report of the annual business meeting which follows is out of context since the meeting was conducted before the midday break.

ANNUAL BUSINESS MEETING, JULY 24, 1964

President John Q. Burch, presiding, called for a motion to waive reading of the minutes of the previous annual business meeting since an accounting had appeared in the annual report bulletin for 1963. Motion made, seconded, carried.

The Secretary read the following report of her office covering the twelve-month period ending June 1, 1964:

REPORT OF AMU SECRETARY

The American Malacological Union continues to enlarge its membership; 85 applied and were enrolled as members in 1963-1964 bringing the present roster to 838. Membership is divided as follows: 574 are regular members, 213 hold joint membership, there are 17 paid life members, 5 honorary life members, one honorary life president, and 28 corresponding members. Because of geographical residence, 190 AMU members are also members of the Pacific Division.

Over the past year notice was received of the death of these members: Caleb Hollingsworth, Mrs. Charles S. Lewis, Mrs. Willard Mohorter, William A. Smith, and Dr. Julius Wisoff. Further reduction to the membership roll was brought about by 17 resignations and 9 who were dropped for delinquent dues.

Members in all categories were polled regarding adoption of the proposed new AMU and Pacific Division Constitutions printed in the *1963 Annual Report Bulletin*. Of the 212 who returned signed ballots, all but three voted in favor of adoption.

Information relating to the AMU was furnished the committee acting on incorporation, and notarized statements were made by the President and the Secretary.

Since but two general mailings each year are now made by the Secretary, the Elliott addressing machine was turned over for the use of the Treasurer.

Arrangement was made between the editorial staff of the AMU and the Johnson Reprint Company of New York City whereby out-of-print issues of the annual report bulletins are to be reproduced by photo-offset at no cost to the AMU for service or promotion. Fifteen percent of the net sales will be paid as royalty to the AMU treasury.

Seven hundred fifty copies of the *1963 Annual Report Bulletin* were printed at a per copy cost of \$1.28.

One hundred fifty-five copies of *How To Collect Shells* have been sold over the past year, 203 copies remain. Net profit to date, \$498.24.

Public interest in shells continues to mount. Over the past twelve months 912 letters requesting information were received and answered, largely with mimeographed or printed material. A large proportion of such letters are written by grade and high school students who have selected the collection and study of shells as a science project. A form letter has been drafted, bringing to these young people knowledge of advantages and rewards of choosing to pursue a scientific career. Any additional literature that may aid or encourage these youthful seekers will be received with gratitude.

This report of the Secretary was approved as read. The report of the AMU Treasurer for 1963 had not been printed since the annual report bulletin goes to press well before the close of the fiscal year. The following report for 1963 was furnished each member of the Executive Council in advance of the meeting:

AMERICAN MALACOLOGICAL UNION FINANCIAL REPORT FOR 1963

Balance on hand January 1, 1963:

Life Membership Fund \$ 970.88

Checking account	1,139.26	
Cash and stamps on hand (Secretary)	10.49	\$2,120.63
<i>Receipts:</i>		
Membership dues	1,856.60	
Pacific Division assessments collected	72.50	
Miscellaneous donations	40.00	
Sales, <i>How to Collect Shells</i>	306.06	
Sales, back issues Annual Reports	4.50	
Interest on savings account	102.90	
Refund of Pacific Division advance	25.00	
Miscellaneous bank credits	1.49	2,409.05
Balance forward		\$4,529.68
<i>Expenditures:</i>		
Print and mail Annual Report	846.38	
Pacific Division assessments forwarded (includes 0.50 from 1962)	73.00	
Administrative expenses: Secretary	432.05	
Treasurer	107.93	
Editor	5.00	
Pacific Division Secretary	41.60	
Refund of overpayment on HTCS	1.35	
Miscellaneous bank charges	2.30	1,509.61
Balance forward		\$3,020.07
<i>Balance on hand December 31, 1963:</i>		
Life Membership Fund	970.88	
Savings account	1,493.00	
Checking account	541.00	
Cash and stamps on hand (Secretary)	7.64	
Cash and stamps on hand (Treasurer)	7.55	3,020.07
Balance forward		\$3,020.07

I certify that this accounting is complete and accurate to the best of my knowledge.

Jean M. Cate, Treasurer
American Malacological Union

This account audited and approved January 4, 1964. Auditing committee: Myra Keen, Chairman; J. B. Burch; John E. Fitch.

Since the Annual Reports must go to press before the end of the current year, the only complete Treasurer's Annual Report we can furnish covers the period of fiscal 1963. However, the benefits from the change in the dues period far outweigh the inconvenience of publishing a somewhat outdated report. A more up-to-date, but unofficial semiannual report was furnished the Executive Council in July 1964; it showed a substantial gain in our overall balance over the figures reported here.

The incorporation of the American Malacological Union was accomplished during the early months of 1964. The cost of this transaction was extremely low, and was more than covered by the interest earned on the savings account during the first six months. By this time next year we hope the AMU will also have achieved tax-exempt status.

We are currently earning the high rate of 4.9% on the savings account,

which is kept at the highest possible level commensurate with our expected expenditures, with a minimum working balance maintained in the checking account against foreseeable need.

The report of the Treasurer was approved as read.

The Secretary was asked to report on action taken by the Executive Council on occasion of the July 21, 1964 meeting of that body.

EXECUTIVE COUNCIL ACTION

Invitations to hold the 1965 AMU meeting in Ottawa, Ontario, San Antonio, Texas, and Staten Island, New York were heard; the invitation to meet in New York was accepted.

That incorporation of the AMU as a scientific, nonprofit organization had been accomplished was reported in a communication from Karl Jacobson, Chairman of the Committee on Incorporation. Dr. Myra Keen had been asked to serve as a permanent director since a California address must be maintained; it was decided that the other two directors required would be the annual currently elected AMU President and Vice-President.

Since the poll taken in January was favorable, the new AMU Constitution and AMU Pacific Division Bylaws were declared to be in effect.

It was decided that since *How To Collect Shells* will be out of print in about 12 or 18 months, the type being held by the printer should be sold and the Publications Editor be instructed to take immediate steps to compile a revision.

The report of the Nominating Committee was heard and the Council went on record as giving unanimous approval of the slate as read.

President Burch called for a report from the Nominating Committee; Chairman Katherine Palmer responded:

REPORT OF THE NOMINATING COMMITTEE

The following slate had been prepared:

President, Juan J. Parodiz; Vice-President, Ralph W. Dexter; Second Vice-President (Chairman, Pacific Division), Edwin C. Allison; Secretary, Margaret C. Teskey; Treasurer, Jean M. Cate; Publications Editor, M. Karl Jacobson; Councillors-at-Large, William H. Heard, Leo G. Hertlein, Leslie Hubricht, Richard I. Johnson.

Following reading of this slate a motion was made from the floor that the nominations be closed and that the Secretary be instructed to cast a unanimous ballot for the slate as read. Seconded, carried.

A suggestion was made from the floor that if the Secretary desires to purchase an addressing machine to replace the small obsolete model now being used by the Treasurer, she be empowered to purchase the machine of her choice. Put into the form of a motion, it was carried.

President Burch on behalf of the AMU extended further thanks to the hard-working Dundees and their associates for a successful annual meeting.

Then calling upon Dr. Juan Parodiz—now President Parodiz—he welcomed him as his successor and surrendered the gavel. President Parodiz extended his own thanks for the honor bestowed upon him and enjoined everyone to make plans to attend next year's meeting, and to bring all of the pictures

taken on the occasion of the previous Staten Island meeting, "It will be pleasant to see them again after ten years."

He then brought the 1964 business meeting to its official end.

Early afternoon adjournment made possible a long dinner period before the final feature of the meeting and many parties took advantage of the opportunity to sample still one more of the city's fine eating places.

Early evening found everyone proceeding, mostly afoot for it was a short distance, to the river, there to board a chartered excursion boat for a moonlight cruise on the Mississippi. A full moon though hazy enhanced a balmy evening; music for dancing was provided but went almost unnoticed since the open decks held greater attraction.

Down river past a seemingly endless series of freighters and tankers, some being lightered or loaded, others dark and somehow sinister. Then back against the current and beneath the massive Greater New Orleans Bridge that spans the river above the city; finally back to dockside and the end not only to a most pleasant evening but to one of the most memorable annual meetings that the AMU has ever enjoyed.

MARGARET C. TESKEY, Secretary
American Malacological Union, Inc.

MEMBERS AND GUESTS IN ATTENDANCE

Dr. R. Tucker Abbott, Academy of Natural Sciences of Philadelphia
James E. Allen, Alexandria, Louisiana
Herbert D. Athearn, Cleveland, Tennessee
Mr. and Mrs. William R. Baker, Winnsboro, Louisiana
Dr. and Mrs. Elmer G. Berry, National Institutes of Health, Bethesda, Maryland
Walter C. Blinn, Michigan State University
James D. Broadus III, Lexington, Kentucky
Dr. John B. Burch, University of Michigan
John Q. Burch, Los Angeles, California
Thomas Burch, M.D., Washington, D. C.
Nell Causey, Louisiana State University
Dr. and Mrs. Arthur H. Clarke, Jr., National Museums of Canada, Ottawa, Canada
Dr. William J. Clench, Museum of Comparative Zoology, Cambridge, Massachusetts
Mr. and Mrs. Gene Coley, Punta Gorda, Florida
Juliette Compitello, Brooklyn, New York
Dr. and Mrs. Henry E. Coomans, American Museum of Natural History, New York
Ruth Craine, Norwich, New York
Dr. Charlotte Dawley, University of North Carolina
Grace Duncan, Louisiana State University in New Orleans
Dr. Dee Dundee, Louisiana State University in New Orleans
Dr. Harold Dundee, Tulane University
Adele and Clark Emery, South Miami, Florida
Elizabeth Eubanks, Pasadena, Texas
Frances Ewing, Altoona, Pennsylvania
Dr. Dorothea Franzen, Illinois Wesleyan University
Elise Garr, Lewiston, Maine
Laura Gilbert, San Antonio, Texas
Inez Gruetzmacher, Menominee, Michigan
Dr. Gordon Gunter, Gulf Coast Research Laboratory, Ocean Springs, Mississippi
Walter J. Harman, Louisiana State University in Baton Rouge
Dr. and Mrs. Harold W. Harry, Rice University and Texas A and M
Dr. William Heard, Florida State University
Pat and Henry Hermann, Louisiana State University in Baton Rouge
Lilburn Hettick, Bartlesville, Oklahoma
Jean Houlehan, Ottawa, Ontario, Canada
Julia Huber, University of Michigan
Leslie Hubricht, Meridian, Mississippi
Billy G. Isom, Tennessee Valley Authority, Florence, Alabama
Mr. and Mrs. Richard I. Johnson, Chestnut Hill, Massachusetts
Carolyn Judkins, Treasure Island, Florida
Freda Knauer, Drexel Hill, Pennsylvania
Louise and William S. Kraemer, University of Arkansas
Gene Lindsay, University of Michigan
Theresa Marsh, Pompano Beach, Florida

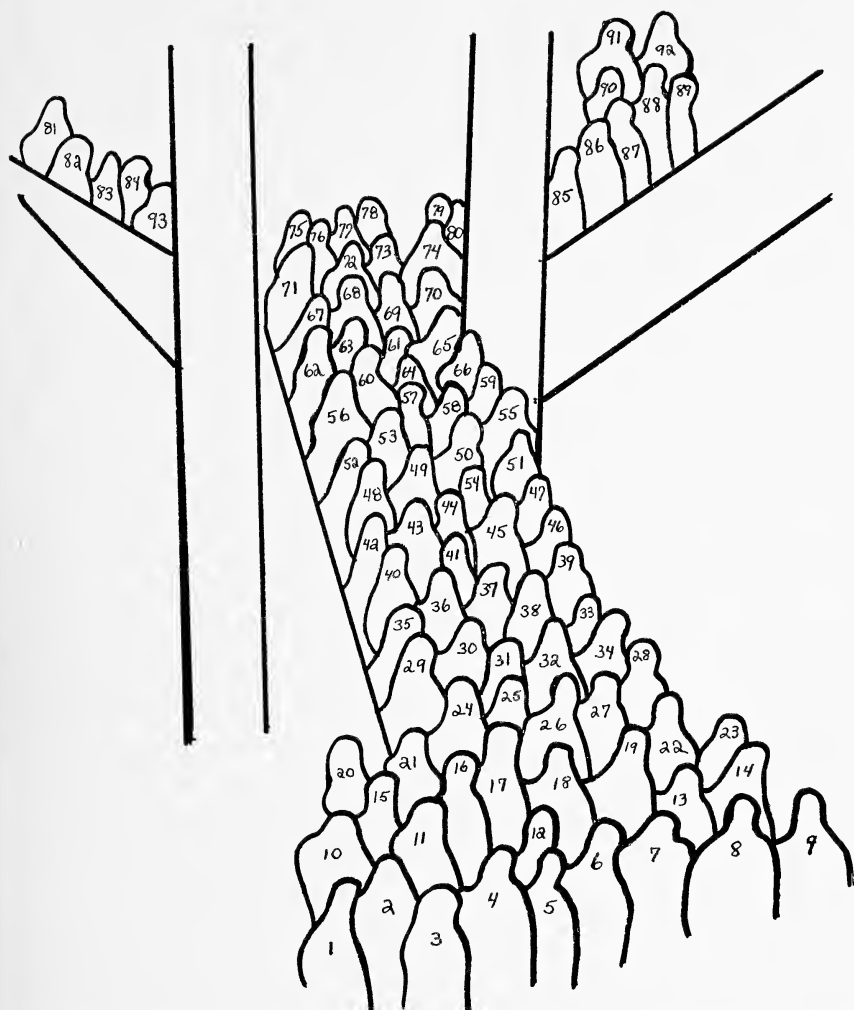


AMERICAN MALACOLOGICAL UNION 30TH ANNUAL MEETING

NEW ORLEANS, LOUISIANA

JULY 21-24, 1964

1. Maud Nickerson Meyer, 2. Harvey G. Meyer, 3. Mrs. Henry Coomans, 4. Dr. Tom Burch, 5. Dr. Juan Parodiz, 6. Margaret Teskey, 7. John Q. Burch, 8. Dr. Harold Dundee, 9. Dr. R. Tucker Abbott, 10. James Broadus, 11. Dr. Henry Coomans, 12. Mrs. Juan Parodiz, 13. Myra Taylor, 14. Dr. E. Laurence Palmer, 15. Cynthia Coomans, 16. Mrs. Richard Johnson, 17. Mrs. Raja Natarajan, 18. Raja Natarajan, 19. Dr. William J. Clench, 20. Sally Johnson, 21. Ruth Craine, 22. Dr. Henry van der Schalie, 23. Margi Johnson, 24. Elise Garr, 25. Germaine Warmke, 26. Richard I. Johnson, 27. Mrs. van der Schalie, 28. William S. Kraemer, 29. Dr. Dorothea Franzen, 30. William Reader, 31. Mrs. William Reader, 32. Dr. John B. Burch, 33. Inez Gruetzmacher, 34. Louise Kraemer, 35. Dr. Charlotte Dawley, 36. Maryl Weatherburn, 37. Dr. Katherine V. W. Palmer, 38. Mrs. Elmer Berry, 39. Dr.



Elmer G. Berry, 40. Elizabeth Eubanks, 41. John Weatherburn, 42. Dorma Coley, 43. Mr. Coley, 44. Muriel Weatherburn, 45. Herbert Athearn, 46. Lilburn Hettick, 47. Laura Gilbert, 48. Marian Schroth, 49. Madeline Merren, 50. Unknown, 51. Unknown, 52. Mildred Tate, 53. Juliette Compitello, 54. Jean Houlehan, 55. Dr. Max Matteson, 56. Carl Withrow, 57. Freda Knaeur, 58. Frances Ewing, 59. Marguerite Waggoner, 60. Arthur H. Clarke III, 61. Mrs. Henry Wehringer, 62. Mrs. Arthur H. Clarke, 63. Henry G. Wehringer, M.D., 64. Theresa Marsh, 65. Adlai B. Wheel, 66. Mrs. Adlai Wheel, 67. Dr. Arthur H. Clarke, Jr., 68. Carol B. Stein, 69. Julia Huber, 70. Dr. William Heard, 71. Dr. Harold Murray, 72. Billy Isom, 73. Lulu B. Sickman, 74. Leslie Hubricht, 75. Mrs. Gordon Usticke, 76. James Allen, 77. Walter Blinn, 78. Gordon Usticke, 79. Dr. Harold Harry, 80. Mrs. Harold Harry, 81. Donald Moore, 82. Dr. Ruth Turner, 83. Mrs. Patricia Hermann, 84. Dr. David Stansbery, 85. Elizabeth Witt, 86. Dr. Gordon Gunter, 87. Dr. Joseph Morrison, 88. Gertrude Moller, 89. Dorothy Raeihle, 90. Dr. Arthur Merrill, 91. Robert Wakefield, 92. Gene Lindsay, 93. Dr. Dee Dundee.

Dr. Max R. Matteson, University of Illinois
 Madeline Merren, Port Arthur, Texas
 Dr. Arthur S. Merrill, U. S. Bureau of Commercial Fisheries, Easton, Maryland
 Mr. and Mrs. Harvey G. Meyer, Captiva, Florida
 Gertrude Moller, Jacksonville, Florida
 Donald R. Moore, University of Miami Marine Laboratory
 Dr. Joseph P. E. Morrison, U. S. National Museum, Washington, D. C.
 Dr. Harold D. Murray, Trinity University, San Antonio, Texas
 Dr. and Mrs. Raja Gopala Natarajan, University of Michigan
 Dr. Ephraim L. Palmer, Cornell University
 Dr. Katherine Palmer, Paleontological Research Institution, Ithaca, N. Y.
 Dr. and Mrs. Juan J. Parodiz, Carnegie Museum, Pittsburgh, Pennsylvania
 Dr. Thomas E. Pulley, Houston Museum of Natural Science, Houston, Texas
 Dorothy Racihe, Elmhurst, New York
 Mr. and Mrs. William R. Reader, St. Petersburg, Florida
 Marian Schroth, New York City
 Lulu B. Seikman, St. Petersburg, Florida
 Dr. David H. Stansbery, Ohio State Museum, Columbus, Ohio
 Carol B. Stein, Ohio State Museum, Columbus, Ohio
 Bennie Strickland, Louisiana State University Medical School
 Mildred Tate, Lake Jackson, Texas
 Myra Taylor, San Antonio, Texas
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 Marguerite Waggoner, Lockport, Louisiana
 Robert Wakefield, University of Michigan
 Germaine Warmke, Institute of Marine Biology, Gainesville, Florida
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 Maryl Weatherburn, Ottawa, Ontario, Canada
 John Weatherburn, Ottawa, Ontario, Canada
 Dr. and Mrs. Henry G. Wehringer, Chicago, Illinois
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 Dr. and Mrs. Henry van der Schalie, University of Michigan
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1964-1965



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AMERICAN MALACOLOGICAL UNION, PACIFIC DIVISION SEVENTEENTH ANNUAL MEETING

The seventeenth annual meeting of the Pacific Division of the American Malacological Union was held at Asilomar, Pacific Grove, California, June 18-21, 1964.

Registration began at 10:00 A.M. on the 18th under the direction of Lucille Zellers, Reservation and Registration Chairman; Mae Dean Richart, Treasurer; and Florence Lafayette, Hospitality Chairman.

The meeting was officially opened by Chairman Myra Keen at 1:30 P.M. with a welcome address to the 73 registered members and guests. It was a great honor to have present the current AMU President John Q. Burch; 5 AMU Past Presidents, Dr. Joseph Bequaert (also an Honorary Life Member), Dr. Albert R. Mead, Allyn G. Smith, Dr. William K. Emerson, and Dr. A. Myra Keen; and AMU Honorary Life President Dr. S. Stillman Berry and AMU Honorary Life Member Dr. Fritz Haas. The AMU Treasurer Jean Cate was also present.

Following several announcements and a review of the conference program and rules, the first paper was presented.

"Shells and Their Keepers, a World Tour of Museums," by Alan Solem, Curator of Lower Invertebrates, Chicago Natural History Museum.

(Abstract)

During a 14-month study trip involving collecting and museum study of Pacific Ocean endodontid land snails, visits were made to most of the major natural history museums of New Zealand, Australia, and Europe. Selected photographs illustrated varying techniques of curation and informal portraits of museum conchologists. The talk was prefaced with a warning as to the hazards of traveling with electrical equipment and concluded with announcement of a new distributional theory concerning European museums. Further details of "Solem's Law" can be obtained directly from the author.

Scientific results from the study trip are still in manuscript and now total approximately 950 typed pages.

"West American Species of *Lirularia*," by James H. McLean, Stanford University.

(Abstract)

Lirularia Dall, 1909, type species *Margarita lirulata* Carpenter, has been considered a subgenus of *Margarites* Gray by recent authors. The generic group of *Lirularia* differs from *Margarites* in having a smaller shell, and the color is mottled rather than solid. The central and lateral teeth of the radula lack the cusps of *Margarites*. *Lirularia* is here considered to merit full generic rank. In *Bulletin 112* (1921) Dall listed 15 species and varieties of *Lirularia*. Six of these named forms are recognizable as valid biological species: *L. optabilis* (Cpr.), *L. parcipecta* (Cpr.), *L. acuticostata* (Cpr.), *L. succincta* (Cpr.), *L. funiculata* (Cpr.), and *L. lirulata* (Cpr.). Two additional species have since been discovered—*L. aresta* (Berry) and a new species (McLean, MS), bringing the total to eight in the temperate regions of western North

America. *L. optabilis* is known only from early Pleistocene assemblages in California. Publication of a full review and discussion of these species is anticipated.

After a short recess, Dr. Rudolf Stohler, Associated Research Zoologist, University of California, and Editor of the *Veliger*, spoke on the subject "Contributions by Amateurs to Science." The amateur with time to observe and experiment and enthusiasm in new knowledge will go ahead, while the scientist is more apt to be cautious, due to his knowledge and specialization, and does not attempt that which seems to be impossible. Thus the amateur through his efforts contributes much to the scientific world.

(NO ABSTRACT SUBMITTED)

Twila Bratcher presented an interesting paper, "Project with Shells." Her deep-felt enthusiasm for the extremely worthwhile project touched the hearts of the audience. We commend her for her efforts in helping the blind youngsters "see."

(Abstract)

For our first pilot project, we put the shells in plastic bags with the name in Braille on a loose strip in the bag. We found that plastic bags are very difficult for blind children to handle, and they fumbled and dropped the name strips. Now we use the type of sectioned box in which jams and jellies are shipped. We glue the compartments solidly to the box, sometimes removing one or two compartments to make room for larger shells. A number in India ink is made permanent on the shell with a dab of clear nail polish, and a matching number is inked on the Braille label glued to the compartment containing the shell. The same number on the typewritten description enables the teacher to easily straighten out the shells if they become mixed when the children handle them. Some teachers Braille the entire descriptions and set them out on a table with the shells on them for the children to study.

The descriptions contain the scientific name, common name, the geographical location, ecological location, and other interesting facts such as what the animal eats, where it lays its eggs, how it has been used by various cultures, etc. Care must be taken that the word picture painted is within the comprehension of a child without sight.

In working out our pilot project we chose the Frances Blend School for the Blind in Los Angeles because it was close enough to interview teachers and students. There are 12 rooms with 10 to 12 children to a room. We made up 12 boxes of shells, each containing a *Cypraea*, *Murex*, cone, and bivalve. We tried to use as many species of each as we could. Each box contained two echinoderms and at least one shell with operculum in place glued to removable cotton with an explanation of the operculum. In the remainder of the compartments we put pieces of corals, a sea horse, gorgonian corals, and various other shells. By making each box as different as possible, the boxes could be rotated among the rooms, giving each child more shells to handle and examine. The Pacific Shell Club members had been quite generous with shells for the project, so we added a "take home" shell for each child. Knowing there were not more than 12 children to a room, we carefully selected 12 shells as nearly identical as possible for each room. This proved very popular.

One of the teachers recently suggested that for classroom study a half

dozen specimens of the same species would be valuable because each child could examine a specimen while the teacher talked about it, whereas it takes too long to pass a single specimen for a dozen children to examine. Mrs. Halfacre, one of the teachers of the Frances Blend School for the Blind, wrote the following: "It seems to me that shells, the animals once living in them, their interdependence, their (often) importance, and the ocean in which they live all form lessons in science interesting and reasonably easy for younger children to comprehend. Aside from any educational value (strictly speaking) it seems to me shells are especially interesting to a blind child. They are tangibles in his world of intangibles. They are small enough to be felt in entirety. A trip to the beach is more interesting when a child has learned to look for shells, when he knows what he has found, can name it, and perhaps tell someone about it. This is exciting."

The Pacific Shell Club is enthusiastic about continuing the project and intends to give shells to schools and services for blind children not only in its own area but in other parts of the United States and foreign countries as well where Braille may be read in English.

At the close of the afternoon session the Executive Council met.

Thursday evening a reception was held with Kay Gudnason and Anna Thomas as hostesses. The table decorations were a work of art, combining shells with Hawaiian motifs. A floral arrangement of anthrium and red ginger was placed beside a three-tiered shell-fountain punchbowl, from which red punch seemed to cascade down from the mouth of a fish. Shells and exquisite dishes with shell designs held nuts, cookies, and petits fours, while turbo shells were used as sugar bowl and creamer. A side table held an enormous tridacna shell containing punch and a large murex shell used as a vase held beautiful, delicate flowers made of small shells and chiton valves. A vote of thanks to Kay and Anna.

One feature of the evening program was the presentation of the Annual Pacific Division Award, which went to Dr. Wendell O. Gregg for his outstanding contributions to malacology. A second and unofficial award was made by the Chairman—what she chose to call a "Chairman's Award"—to Dr. S. Stillman Berry, whose election by the AMU as Honorary Life President had made him ineligible for the Pacific Division Award. Dr. Berry's numerous contributions to malacology are well known to all. The evening program continued with a talk by Allyn G. Smith on the conditions and the flora and fauna of the Galápagos. His commentary was accompanied by color slides.

The meeting was opened Friday morning with announcements and a letter from Margaret Teskey, AMU Secretary, conveying greetings to the Pacific Division and good wishes for a successful conference.

Dr. Victor L. Loosanoff, Senior Scientist, U. S. Bureau of Commercial Fisheries, Tiburon, California, was the first speaker, "Enemies of Commercial Shellfish."

(Abstract)

The paper discussed predators and competitors of such commercial species as oysters and clams, and methods of their control. The discussion did not include bacteria, fungi, or other microscopic forms often responsible for heavy mortalities. It dealt, however, with a wide variety of enemies beginning

with aquatic plants such as *Codium*, and included sponges, coelenterates, flat worms, and annulates. Among the arthropods, the roles of barnacles, mud shrimps (*Upogebia* and *Callianassa*), and several species of crabs were discussed and illustrated with color slides. Destructiveness to young clams of the horseshoe crab, *Limulus polyphemus*, was described.

Mollusca, principally boring gastropods, were another large group of predators whose destructive activities to shellfish beds were discussed. The destructiveness of *Polinices duplicata*, *Urosalpinx cinerea*, *Eupleura caudata*, *Murex pomum*, *Busycon candiculatum*, and *Busycon contrarium*, were especially emphasized. Among competitors of young oysters, several species of *Crepidula* and *Anomia* were mentioned. Other organisms competing with young oysters for space and food that were discussed in the paper were tunicates and mussels. Importance of the starfish as an oyster enemy, especially *Asterias forbesi*, which is the common starfish of the Atlantic coast, was described. Chemical and physical methods of control of most enemies mentioned were illustrated.

Dr. Alan Solem stated his second paper, "Neotropical Land Snail Genera *Labyrinthus* and *Isomeria*: a Challenge to Scientist and Collector," should have been titled "An Object Lesson in Frustration."

(Abstract)

Study of the 1,868 specimens available in thirteen major museums and one private collection resulted in the recognition of 56 species of mainland New World camaenids. Five species were divided into two subspecies and two species into three subspecies. An additional five nomenclatural units could not be recognized. Four species and one subspecies were previously unknown and a new name is proposed for an additional taxon. Of the 70 nomenclatural units, 28 (40%) were represented by 0-5 examples; 22 (31.4%) by 6-20 shells; 12 (17.2%) by 21-80 specimens; and 8 (11.4%) by more than 81.

Representation in most museum collections was very poor. The most comprehensive collections were:

Museum	Percent of taxa	Sets/taxon
Chicago Nat. Hist. Mus.	69.3	3.96
Acad. Nat. Sci. Philadelphia	69.3	2.96
U. S. Natl. Mus., Washington	57	3.22
Zool. Instit., Zurich	50.8	1.39
Roy. Scottish Mus., Edinburgh	43	1.21
Mus. Comp. Zool., Harvard	41.5	2.30

Collections in Brussels, Frankfurt, and Wales probably are of equal size to Zurich and Edinburgh, but could not be examined as a whole.

Despite the sparse material, a number of interesting biological problems were revealed. Although anatomical distinctions have not yet been shown, a division into *Labyrinthus* (aperture greatly constricted by lamellae and found at low elevations) and *Isomeria* (only vestigial traces of lamellae and found at higher elevations) has been followed. The teeth develop only at adulthood and their function is unknown, although long suggested as a possible defense against predation. With negligible exceptions, outside of Ecuador the species are allopatric. In Ecuador, eight *Isomeria* and two *Labyrinthus* have essentially the same geographic ranges. There is no information on ecology and

possible vegetational zonation or differing activity periods of these Ecuadorean species, but the problems are well suited for field investigations.

The few species dissected show very minor anatomical differences, suggesting that *Isomeria* and *Labyrinthus* may be polyphyletic with loss or gain of apertural lamellae having occurred several times. The genitalia are unique among camaenids in developing small calcareous stimulatory hooks in the penis and vaginal areas.

After a short intermission, Keith Cox, Marine Resources Operations, California Department of Fish and Game, presented an illustrated paper on the "Shellfish Culture Laboratories in Japan."

(Abstract)

The Japanese have succeeded in adapting some techniques developed by their marine biologists so that they can propagate and rear abalones (*Haliotis* spp.) as well as a number of other mollusks in large-scale commercial production at a number of shellfish hatcheries.

Adult abalones are induced to spawn by changes in water temperature, and fertilized eggs are collected and held through metamorphosis from the veliger or swimming stage to the benthic or crawling stage. Special foods are cultured and supplied to the veliger and the benthic forms.

The benthic forms are kept in tanks from 4 to 12 months, until their shells are 3 to 4 cm long, then transplanted to a natural environment. Here they are protected until they reach harvestable size (4 inches), in about two years.

Dr. Warren O. Addicott, U. S. Geological Survey, Menlo Park, California, "The Enigmatic Late Cenozoic Gastropod *Schizopyga californiana* Conrad."¹

(Abstract)

The identity of the Pliocene gastropod originally described as *Schizopyga californiana* Conrad (1856), but now placed in the genus *Nassarius*, has long been a matter of doubt and disagreement. Conrad's name has been used for at least six different fossil and Recent species of *Nassarius*. The greatly differing identifications can be traced to a vague original description, poor figure, and missing type specimen. Isolated outcrops of upper Pliocene marine sandstone in northwestern Santa Clara County, California, that are here considered stratigraphically equivalent, if not identical, to the generalized type locality of this species, contain two species of *Nassarius*. One, a rather small, slender species particularly characteristic of these strata, closely resembles the type figure and is believed to be Conrad's species. The other nassariid is a rotund, moderately large species identified as *N. grammatus* (Dall). Among the many fossil and Recent nassariids from the Pacific Coast that have at one time been figured or identified as *N. californianus* are: *N. coalingensis* (Arnold), *N. delosi* (Woodring), *N. grammatus* (Dall), *N. iniquus* (Stewart), *N. mendicus* (Gould), *N. moranianus* (Martin), and *N. rhinetes* Berry. *Nassarius californianus* is a valuable index species to California marine Pliocene formations from the San Francisco Bay area southward to Ventura basin.

The afternoon session opened with an illustrated talk on "Collecting on the Galápagos," by Allyn G. Smith, Associate Curator, Department of Invertebrate

¹ Publication authorized by the Director of the U. S. Geological Survey.

(Abstract)

A period of 5 weeks (January–March 1964) was devoted to collecting mollusks as a member of the Galápagos International Scientific Project sponsored by the Charles Darwin Foundation, organized by the University of California, and supported by the National Science Foundation, the California Academy of Sciences, the Belvedere Scientific Fund, and the Shell Oil Company. The project had effective cooperation from the government of the Republic of Ecuador, local units of the Ecuadorian Navy, and the U.S.S. *Pine Island* with its complement of two seaplanes and two helicopters. A total of about 60 scientists from the United States and other countries participated.

While my specific project was concerned with the distribution and evolution of the land snails, considerable time was spent collecting marine mollusks and other invertebrates, concentrating on the large island of Santa Cruz (Indefatigable), with a 4-day excursion to Genovesa (Tower). Headquarters were at Academy Bay, Santa Cruz Island, site of the Charles Darwin Research Station maintained by the Darwin Foundation. Marine collecting was confined largely to this area, which provided a terrain of tumbled lava boulders and occasional coral-mud flats exposed at low tide, together with high lava cliffs and a mangrove swamp habitat. Some dredging was done in shallow water.

The marine mollusk fauna in these areas was found to be fairly rich in small gastropods but not so much so in larger species; pelecypods were not common; and only a few chiton species were collected. On the whole, the fauna seemed relatively depauperate compared with that in the Gulf of California, for example, although it contains a number of interesting endemic species.

There are two enthusiastic and capable shell collectors at Academy Bay: Carmen (Mrs. Fritz) Angermeyer and Jacqueline (Mme. André) Du Roy, both of whom are continuing to add new records to the Galápagos marine shell fauna.

The shells obtained during the G.I.S.P. are being combined with others at the California Academy of Sciences collected in the Galápagos during prior Academy expeditions in 1905–1906 and 1932. These are now being studied with a comprehensive Galápagos list in mind.

The paper was illustrated with colored slides of the various marine environments encountered.

"Feeding *Dendrodoris (Doriopsilla) albopunctata*, an Opisthobranch Gastropod," by Michael T. Ghiselin, Hopkins Marine Station, Pacific Grove, California.

(Abstract)

That *Dendrodoris (Doriopsilla) albopunctata* (Cooper) feeds on a variety of sponges has been demonstrated by field observations and recovery of spicules from the gut. Earlier references to feeding in the Porostomata may have been speculative. A tubular structure is everted from the mouth during feeding; it is largely a modified pharynx, since vestigial salivary glands are present at its base. The esophagus is greatly reduced. There is no "ptyaline" gland. The pharynx is muscular and lacks hard parts; it contains numerous cells

which secrete a nonsulfated, acid mucopolysaccharide which stains strongly with Alcian Blue 8GX, but gives no visible reaction with Azure A, DMAB-nitrite, or periodic acid-Schiff. Although the gut of Porostomata is morphologically deviant, the diet suggests a possible affinity to cryptobranch dorids.

After a short intermission the lectures resumed and Dr. Albert R. Mead, in his usual rapid-fire, humor-injected manner of speaking, gave an interesting paper on "Gastropods in Scientific Research." See abstract on page 29.

Mrs. Harold Gudnason, member of the Northern California Malacological Club, Berkeley, California, gave a most unusual paper titled "*Unguis Odoratus* and *Purpura* in Ancient Literature."

(Abstract)

The ancient literature of the Bible is recognized as a source of information on many subjects, but few would think of turning to it for reference in the field of malacology. Surprisingly, the whole dramatic history of God's dealing with mankind, and the periods in the rise and decline of man's worship of God, can be traced through the recorded use of two shell substances, *unguis odoratus* and *purpura*.

When the divinely ordered ritual of worship was set up for the Israelites in the wilderness, a prescription was given for compounding the sacred incense (Exodus 30:34). An ingredient was *onycha*, or *unguis odoratus* (Latin), meaning "perfumed nail, or claw." Most of the commentators equate *unguis odoratus* with the operculum of a mollusc, and many believe it to be a *Murex*. *Murex brandaris* Linn. and *Murex ramosus* Linn. are the two species most frequently cited.

The operculum when burned exudes an unpleasant odor, but when combined with spices it enhances their fragrance as do other animal odorants in perfume.

In tracing its use through the Bible we find that during the periods when God was being worshipped in His ordained manner, and thus incense was being burned in His sanctuary, the people were singularly blessed, and conversely, when they rebelled and "burned incense to idols" they were chastened.

Associated with incense, as a color of the priestly garments and hangings of the tabernacle, as well as a color of royalty, was the famous Tyrian dye *purpura* (the color of congealed blood—Pliny). It is known to have been obtained from *Murex* shells. Interestingly, although *Murex trunculus* Linn. was probably the greatest source of the dye, *Murex brandaris* Linn. is reported to have been an important source. Thus this one species could have provided the *unguis odoratus* and the *purpura* for their sacred uses.

In the account of the New Testament church there is no record of incense burning, but it appears again at the close of the volume where, in John's apocryphal vision, is seen a golden altar in heaven, with prayer (symbolized by incense) being offered to the Lord, who is dressed in garments the color of blood (Revelation 8:3, 4; 19:13), "and every creature which is in heaven, and on the earth, and under the earth, and such as are in the sea" is praising Him saying, "Blessing and honour, and glory, and power, be unto him that sitteth upon the throne" (Revelation 5:13).

Thus, side by side down the long path of recorded history, in significant roles, we find these substances from the sea, *unguis odoratus* and *purpura*.

"Notes on New Tropical American Records," by S. Stillman Berry, Redlands, California.

(Abstract)

The following new records and extensions of range have come to light recently:

- (1) *Mitra malleti* Petit de la Saussaye, 1852, was described from an unknown locality but has been recognized among material from San Carlos Bay, Guaymas.
- (2) *Cancellaria (Massyla) corrugata* Hinds, 1843 (type locality, Guayaquil, Ecuador), has been taken by the shrimp boats operating out of Guaymas.
- (3) *Crucibulum pectinatum* Carpenter, 1856 (from Peru), has been taken at Mazatlán, Mexico.
- (4) The West American *Architectonica* usually identified as *A. nobilis* Röding, 1798 is separable from that Caribbean form and probably should be known as *A. granosa* (Valenciennes, 1832).
- (5) The Peruvian shell labeled *Sinum concavum* (Lamarck, 1882) in collections should be called *S. cymba* (Menke 1828), for Lamarck's shell is West African in distribution. The name *S. grayi* (Deshayes, 1843) seems to be available for the form brought in by the shrimp boats at Guaymas, and the name *S. cortezi* Burch and Burch, 1964 may fall as a synonym.

The evening session began with a movie film, "Mussel Fisheries of Holland," narrated by Dr. Victor L. Loosanoff.

(Abstract)

This lecture, illustrated with a movie film, dealt with mussel farming as it is conducted at present in Holland. It described reproduction of mussels (*Mytilus edulis*) in the Wadden Sea and the successive steps in gathering the set after it has developed to a certain stage, and planting it in a number of aquatic areas of Holland. It discussed different steps involved in transplanting the mussels from one area to another, methods employed in these operations, and in the protecting of mussels from their enemies. Role of the biologists and the shellfisheries administrators in maintaining cultivation of mussels on a high level and under high sanitary standards was emphasized. Harvesting mussels, after they reach marketable size, and their preparation for market, both for local consumption and for export to other European countries, were discussed.

Mead French showed color slides, candid shots of various members taken during the 1963 annual meeting at Goleta.

Saturday morning's session began at 9:00 A.M. with William E. Old, Jr., American Museum of Natural History, giving the first paper "Comments on *Thais planospira*."

(Abstract)

The Panamic gastropod that is commonly known as *Thais (Tribulus) planospira* (Lamarck, 1822) was first described and illustrated by George

Perry in his *Conchology* (1811, pl. 44, fig. 2) under the name of *Haustrum pictum*, and was erroneously cited from the "East Indies." Perry's taxon, however, is a *nomen oblitum* according to the requirements of the present code and, therefore, is not available for this species.

It should be noted that Lamarck (1816, vol. 3, pl. 397, figs. 5a, 5b), in the *Tableau Encyclopédique et Méthodique*, figured a shell that was identified as *Purpura lineata* in the *Liste* accompanying the figures. Later, Lamarck (1822, vol. 7, p. 240) in *Animaux Sans Vertèbres*, described *Purpura planospira*, citing the figures in his work of 1816, and placed *P. lineata* in synonymy. *Purpura lineata* Lamarck (1816) also must stand as a *nomen oblitum*.

The present distribution and the fossil occurrences were cited for this species.

Dr. Jerry Barnard, speaking for John R. Grady, Beaudette Foundation, gave a "Preliminary Report on the Physical Environment of Bahia de Los Angeles, Baja California, Mexico."

(Abstract)

Three expeditions to Bahia de Los Angeles, Baja California, Mexico, were made by the Beaudette Foundation in 1962 and 1963. Over 161 benthic samples were taken and 14 hydrographic stations occupied in the southern portion of the bay. Bathymetry of the bay shows the floor to have little relief with a gradient of 24 minutes from south to north to the central floor. Volcanic extrusives bordering the east slope show declivities up to 16°, whereas those to the west and south are about a degree. The main source of sediments is from the south and west. Sediment types run from coarse silt to medium sand. The average composition is 53.6% sand, 42.0% silt, and 4.0% clay. The average carbonate content is 5.29%. Salinity varies from 35.07 to 35.67‰. Water temperature varies from 14.3 to 26.4 degrees. The dissolved oxygen minimum is 2.39 ml/liter. Supersaturated values over 9.00 ml/liter occurred during the spring plankton blooms.

Eugene V. Coan, Stanford University, followed with a paper titled "Biometrical Analysis of Mollusca, Bahia de Los Angeles, Baja California, Mexico."

(Abstract)

Collections of the Beaudette Foundation were made in April and October 1963, samples being taken with a grab over a large area of this bay. Living specimens were separated from nonliving material so that only the forms living in the bay at the time of sampling were studied. Most of the material collected in April and in October proved juvenile, the amount collected in October being much less than in April in terms of number of species and specimens. This may be due to grazing by sharks and rays.

Preliminary results show that each common species has a characteristic distribution pattern, most often correlated with depth. A computer study of association was carried out that shows an absence of distinct associational groupings, though there is gradational change in species from shallow to deeper water.

Robert R. Talmadge, Field Associate, California Academy of Sciences, San Francisco, California, "Stomatellids, What Are They?"

(Abstract)

Few taxonomic works are in agreement on the systematic treatment of the stomatellids. Specimens are not plentiful in the major research collections, and the lots of shells usually consist of only a few specimens each. Both ecological and anatomical data are negligible.

I have had the opportunity to examine soft parts of some specimens representing most of the accepted genera, and at the present time it appears that there are two distinct, easily separable, animal groupings. The groupings may be correlated with shell groupings.

It was found that there are strong shell variations in color and size within a species. When such variations were considered, the soft parts compared, and this information fit into the apparent sporadic distribution of certain species, definite synonyms were noted.

However, due to lack of comparative material, only a few of the many species could be better understood. As specimens are usually quite small, dull in coloration, and fragile, few collectors are interested in this family or families of Mollusca.

Dr. Edwin C. Allison, San Diego State College, Department of Geology, San Diego, California, "Fossil and Modern Extratropical Species of the Genus *Arca* in Northern Pacific."

(Abstract)

Distinctive hinge, ligament, and muscle attachment characteristics of the modern northwestern Pacific *Arca* species, *A. boucardi* Jousseaume, are found in post-Miocene Japanese and western North American species recognized as *A. miyatensis* Oyama, *A. boucardi* Jousseaume, and *A. sisquocensis* Reinhart. These species are confined to fossiliferous rocks labeled Pliocene and Pleistocene on both sides of the Pacific Ocean; *A. boucardi* still lives in shallow waters off northern Japan and Sakhalin. Truly tropical areas of similar superficial appearance are clearly distinguishable from the northern species. No precursor for *A. boucardi* and its post-Miocene relatives is known in the Pacific Ocean. *A. tetragona* Poli, which lives in the eastern Atlantic, from the Mediterranean Sea northward, is comparable to species of the northern Pacific but, likewise, appears to lack close relatives in rocks older than Pliocene.

Arca sisquocensis has been cited as evidence for warmer Pliocene seas along the coast of California than occur at similar latitudes today. Fossils associated with *A. sisquocensis* at localities distributed from northern Baja California to northern Alta California suggest cooler water habitats, not unlike those in which its closest relative, *A. boucardi*, lives today.

Joseph C. Clark, Stanford University, opened the afternoon session with "Te Vega Expedition to the Maldives Islands, Indian Ocean, 1964."

(Abstract)

Participating in the International Indian Ocean Expedition, the research vessel *Te Vega*, operated by Stanford University, worked in the Maldives Islands during March and April 1964. The scientific personnel, consisting of a chief scientist, 6 senior scientists assigned to the expedition, and 8 students, collected specimens of marine life primarily in the shallow, tropical waters of the coral atolls. In spite of numerous difficulties with the vessel, collections

were obtained of fish, mollusks, decapod crustaceans, ophiuroids, algae, and Foraminifera.

Specimens of the bivalved gastropod *Berthelinia* came to light in material from the reef flat of South Nilandu Atoll, Maldives.

Sister M. Aquinas Nimitz, O.P., Dominican College of San Rafael, "Reproductive Physiology in *Chiton katharina*."

(Abstract)

The reproductive cycle of the chiton *Katharina* has been followed for 2 years through monthly determinations of the average gonad index of 10 to 20 animals. (Gonad index = $\frac{\text{volume in gonad in ml} \times 100}{\text{wet weight of the animals in g}}$.) The gonad index remains low though fluctuating from August through December (1-3), rises to a peak (7 or greater) in late spring, and then drops precipitously in as spawning occurs in May, June, or July.

The location of nutrient reserves has been correlated with different phases of the reproductive cycle through application of histochemical tests to microscopic sections.

The chief sites of nutrient reserves observable histochemically are the germinal epithelial cells of the gonads and storage cells of the foot and mantle ridge. The germinal epithelial cells store neutral lipid and a glycogen-like material, both of which diminish in quantity during gametogenesis. In the female the disappearance of lipid from the germinal epithelium coincides with the accumulation of lipid in the oocytes.

Special storage cells of the foot and mantle contain neutral lipid globules and minute granules (1 to 2 μ) which stain with phospholipid and protein procedures. The globules and granules are imbedded in a matrix of glycogen-like material. The granules, which may have a nutritive function, disappear from the cells 2 months before spawning and reappear after spawning. There is no histochemical evidence for marked utilization of lipid from the storage cells of the foot and mantle during normal gametogenesis, but these lipid depots are depleted when a period of starvation is coextensive with the 5 months of active gametogenesis. A starving animal produces fewer gametes than a normal one, but the gametes are normal insofar as can be determined histochemically.

Dr. A. Myra Keen presented the last paper of the session, titled "Some Nomenclatural Problems."

(Abstract)

Revisionary work for the *Treatise on Invertebrate Paleontology*, Gastropod volume II, has revealed a number of problems that seem to require petitions to the International Commission on Zoological Nomenclature for solution. The type species of a number of genera have been misidentified by authors, and several other problems seem to necessitate an appeal for suspension of the Rules if stability of nomenclature is to be maintained. Three petitions, therefore, have been submitted to the Commission, which should be published in the *Bulletin of Zoological Nomenclature* within a few months, at which time interested persons can submit comments on these proposed actions to the Commission.

The annual business meeting of the American Malacological Union-Pacific Division was called to order by the Chairman, Dr. A. Myra Keen, at 3:30 P.M., July 20, 1964.

The registrar reported a total of 73 having registered for the conference.

It was voted that the minutes of the 1963 AMU-PD meeting at Goleta be accepted as printed in the AMU bulletin.

The treasurer gave a report showing, currently, a balance on hand of \$587.92, which was accepted.

Bylaws Revision Committee Chairman Dr. Rudolf Stohler read the following amendments to the proposed Bylaws of the Pacific Division of the American Malacological Union, Inc.

Article III, Section 2 (2) :

(2) Nominations for an Award, accompanied by suitable documentation, may be submitted in writing to the Executive Board, signed by not less than five AMU members in good standing in the Pacific Division area, at least one month before the scheduled Division meeting at which the Award is to be conferred; they may also be presented by any one member of the Executive Board. The Board shall approve the nomination in writing and a simple majority affirmative vote of the Executive Board (by mail ballot) shall be necessary for adoption of the nomination.

In Article IV, wherever the word "assessment" appears, throughout it should be preceded by the word "annual."

Article IV, Section 3:

(1) A registration fee to be paid by all AMU members, except Honorary Members, and officially invited guests attending. . . .

It was moved and seconded that the amendments to the proposed Bylaws as printed in the 1963 AMU bulletin be adopted. Carried.

It was moved, seconded, and unanimously carried that the proposed Bylaws as printed in the 1963 AMU bulletin and amended by the preceding motion be adopted. (These proposed amendments to the AMU-PACIFIC DIVISION Bylaws are subject to review and approval by the AMU Executive Council.)

In the absence of all three members of the Nominations Committee (Dr. John Fitch, Chairman, Dr. Leo Hertlein, and Dr. Albert Mead) Dr. Rudolf Stohler was asked to read the report sent in by Dr. Fitch: Dr. Edwin C. Allison, Chairman; Dr. Alan J. Kohn, Vice-Chairman; Barbara Good, Secretary; Faye Wolfson, Treasurer. There being no nominations from the floor, a motion was made and seconded to close the nominations and the secretary cast a unanimous vote for the slate of officers as presented. Carried.

An invitation from the Pacific Northwest Shell Club to hold the 1966 annual meeting in Washington and from the Yucaipa Shell Club a standing invitation to meet there was placed on file.

An invitation was accepted from San Diego to hold the 1965 meeting at the Western Methodist College on Point Loma providing the AMU did not hold their meeting in the west. Moved, seconded, and carried.

Moved, seconded, and carried that the legitimate expenses of the AMU-PD treasurer incident to attendance at an annual Pacific Division meeting be refunded insofar as possible from the general fund of the Division.

Moved, seconded, and carried that the Pacific Division pay the sum of \$25.00 to the AMU to reduce debt incurred at previous conferences when money was advanced for PD expenses.

Crawford Cate suggested that members acquainted with absent members convey greetings and expressions of thanks for all the work they had done in the past.

Meeting adjourned at 4:00 P.M.

The Exhibits Chairman Howard Fletcher had assembled a number of unusual exhibits in an anteroom of the Chapel, which were viewed at the leisure of the group.

One outstanding display was by Dr. Donald R. Shasky, "Shells from San Juan Expedition to the Gulf of Tehuantepec, July, 1963." This expedition covered the entire Gulf of Tehuantepec which extends from Puerto Angel to the Guatemalan border. Of particular interest was *Natica scethra* Dall, 1908, which has been unreported since its original description.

Robert R. Talmadge's display featured specimens of *Stomatella* which emphasized his paper.

Kay Gudnason had on display a headdress made from shells from Cannibal Valley, New Guinea, and another featured literature on purple dyeing and shells that were used in ancient times.

Another case contained freshwater shells from South America by Dr. Elsa L. Gonzalez. Concerning it she reported that "Dr. A. Bonetto from the Direction of Natural Resources of the Province of Santa Fe in the City of Santa Fe by the Parana River in Argentina Mesopotamia, sent the shells to me. These shells are freshwater shells from small lakes with fairly stationary waters. All of the lakes are fed by waters of the Parana River and tributaries, carrying waters from quite a bit north from the area, originating in the middle of the Matto Grosso in Brasil. If there is anybody that might be interested in exchanging shells from Argentina for interesting specimens from the USA on a friendly noncommercial basis, I would be glad to supply data. Write to Dr. Elsa L. Gonzalez, 2343 S.W. Cedar Street, Apt. 7, Portland, Oregon."

This collection was later donated to the California Academy of Sciences as a similar suite had been to the American Museum of Natural History.

Also displayed were Mitridae collected by Walter J. Eyerdam on a tiny beach at Sun, Malaita Island, British Solomons on February 22, 1933. Works of art—drawings of octopus and squid, done with brush and pen in diluted India ink, by Carl Conley, were shown by Dr. S. Stillman Berry. Other exhibits were: a box of shells with Braille labels for the blind children, by Twila Bratcher, and bound volumes of the minutes of the Conchological Club of Southern California and papers by the members of the CCSC.

Jean and Crawford Cate had an especially nice display of Mitridae about which Jean commented "This exhibit represents a large number of the mitrid species in the subfamily Vexillinae, which are generally characterized by longitudinal ribbing or by rows of tubercles. With few exceptions, these shells were all collected within the Indo-Pacific area, from Hawaii to Zanzibar."

Special thanks should be given to Captain R. D. Risser, USN, for his generous donation of *Tegula montereyi* Kiener and to Dr. Keen for overruns on sections of her book, "Sea Shells of Tropical West America."

The banquet was held Saturday evening in the Woodlands Dining Hall

with 62 in attendance. Gladys Archerd, Chairman, Mary Larson, and John Saxby of the Northern California Malacological Club were responsible for the table decorations and table favors. Large shells of various species, mounted on stands, with flowers artfully placed at the base were used as centerpieces. Small polished turbo shells (a gift of John Saxby) were filled with colored mints and placed at each setting. Place cards with tiny West Coast shells and coralline algae were glued in the corner to simulate a flower. These cards were made by Gladys using material that she had gleaned from shell-wash taken on the Sonoma Coast. Many thanks to Gladys and her committee for a job well done.

Before the diners left the dining hall to go to the Chapel for the evening program, Myra Keen thanked all those who helped to make the meeting a success.

The gavel was then officially presented to the 1964-1965 chairman, Dr. Allison, thus ending the term of office for Myra Keen.

The final feature of the day's program was an after-dinner talk by Dr. J. Wyatt Durham, University of California, Berkeley, on "The Galápagos Islands Expedition of 1964," which was illustrated with color slides. It brought out different aspects of the 1964 Expedition that had been reported by Allyn G. Smith.

(Abstract)

The Galápagos International Scientific Project Expedition was in the islands from January 19 to February 28, 1964, and in addition spent the 8th and 9th of March at Chatham Bay, Cocos Island on the return trip. The participants included representatives of numerous specialties in botany, zoology, and geology.

The Galápagos are a group of true oceanic islands, distributed over an area about 200 miles square, astride the equator some 600 miles west of Ecuador. Climatically they are on the southern edge of the tropics, with the westward-flowing cool Humboldt Current passing along the southern margin of the group. Precipitation is low except in the higher elevations of the larger islands, and there is little available fresh water.

Geologically the islands are of volcanic origin, arising as a series of volcanic peaks from a submarine plateau whose surface is mostly from 100 to 200 fathoms deep. This plateau in turn rises out of oceanic depths of 1,600 to 1,800 fathoms. All available evidence indicates that the islands have never been connected with the South American mainland to the east nor to Central America to the northeast (via Cocos Ridge) despite previous conclusions to the contrary.

Each of the larger islands represents one or more centers of volcanic activity and, although the evidence indicates a relatively complex history, they do not seem to have ever been connected to one another subaerially. The rocks are of basaltic composition and include both flows and pyroclastics. Locally bioclastic limestones are interbedded in the volcanics. Marine fossils suggest that the islands may be as old as upper Miocene.

After the program the candid shots taken at the 1963 meeting were again shown for the benefit of those who had not seen them the previous evening.

Upon this note of hilarity the 1964 annual meeting of the AMU-PD was officially adjourned by Chairman Ned Allison.

Members and guests who did not have to meet travel schedules were assembled after breakfast on Sunday morning, escorted to the Hopkins Marine Station, and given a guided tour of the installation by James McLean. This was indeed a wonderful ending to our three-day stay in this beautiful area, where the pines and the sea offer relaxation, stimulation of the mind, and refreshment of the spirit.

Respectfully submitted,
LUCILLE ZELLERS, *Secretary*

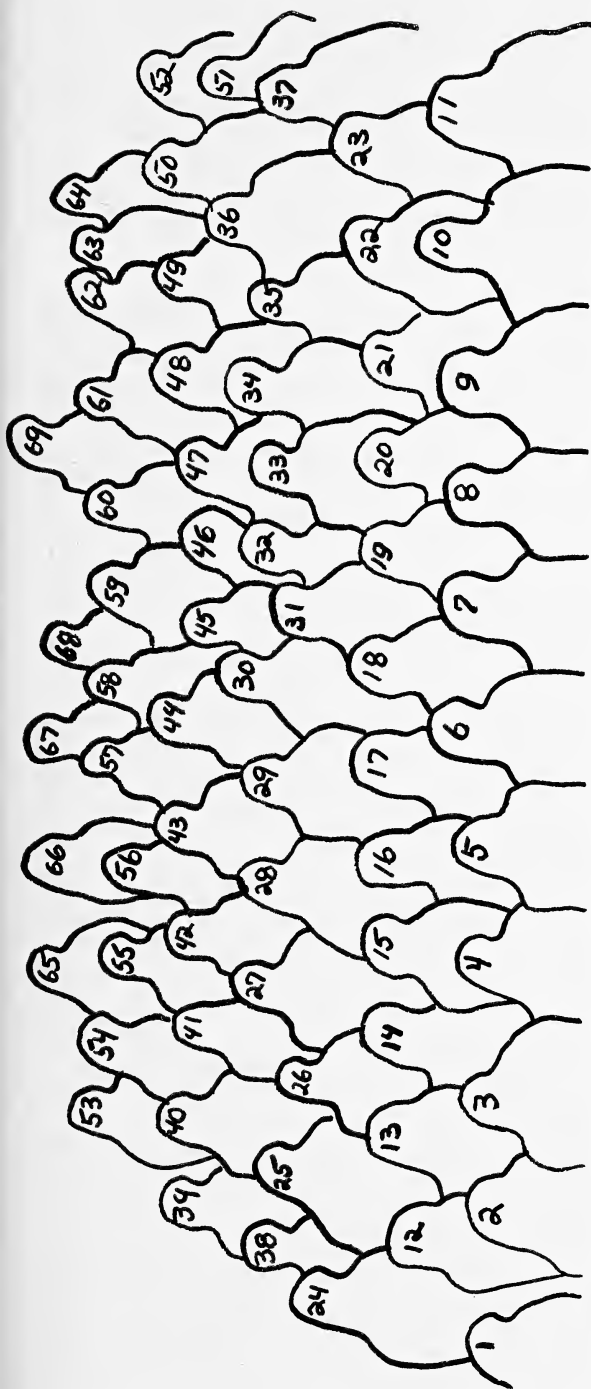
ATTENDANCE LIST—1964 ANNUAL MEETING

Mrs. Edith M. Abbott, San Dimas, California
Dr. Warren Addicott, Menlo Park, California
Dr. Edwin C. Allison, San Diego, California
Mrs. Gladys Archerd, Berkeley, California
Grace Behrens, Santa Barbara, California
Mr. and Mrs. Fred Berg, Santa Barbara, California
Dr. S. Stillman Berry, Redlands, California
Dr. and Mrs. Joseph Bequaert, Tucson, Arizona
Mrs. Priscilla Blesch, Burlingame, California
Mr. and Mrs. Ford Bratcher, Hollywood, California
Mrs. Helen Breyman, Burlingame, California
Mr. and Mrs. John Q. Burch, Los Angeles, California
Dr. Thomas A. Burch, Washington, D. C.
Mr. and Mrs. Crawford N. Cate, Los Angeles, California
Mr. and Mrs. Emery P. Chace, San Diego, California
Eugene Coan, Palo Alto, California
Dr. and Mrs. Wyatt Durham, Berkeley, California
John Durham, Berkeley, California
Dr. William K. Emerson, New York, New York
Walter J. Eyerdam, Seattle, Washington
Mrs. Irene Franchini, Tranquillity, California
Mrs. Bertha Finke, Sacramento, California
Mr. and Mrs. Howard Fletcher, Redlands, California
Effie Forthune, Seattle, Washington
Mr. and Mrs. Mead French, Lomita, California
Dr. Elsa L. Gonzales, Portland, Oregon
Dr. Wendell O. Gregg, Los Angeles, California
Mrs. Kay Gudnason, Oakland, California
Dr. Fritz Haas, Chicago, Illinois
Mr. and Mrs. Edgar Hailey, Oxnard, California
Mrs. Helen Hunt, Berkeley, California
Miss Camilla Ingram, La Crescenta, California
George Kanakoff, Los Angeles, California
Dr. A. Myra Keen, Palo Alto, California
Mrs. Florence LaFayette, Carmichael, California
Mrs. Mary Larson, Concord, California
Mary Long, Sonoma, California
Dr. and Mrs. Victor L. Loosanoff, Tiburon, California
Ella Louise May, Santa Barbara, California

James McLean, Stanford, California
Dr. Albert R. Mead, Tucson, Arizona
Walter B. Miller, Malibu, California
William E. Old, Jr., New York, New York
Mrs. Marianna Paulson, Berkeley, California
Mr. and Mrs. Ted Phillips, Santa Barbara, California
Mrs. Mae Dean Richart, San Francisco, California
Capt. R. D. Risser, Monterey, California
Barry Roth, Palo Alto, California
Frank Russ, Alameda, California
Dr. and Mrs. Donald Shasky, Redlands, California
Allyn G. Smith, Berkeley, California
Dr. Alan Solem, Chicago, Illinois
Gale G. Sphon, Jr., Santa Barbara, California
Dr. Rudolph Stohler, Berkeley, California
Ray Summers, Petaluma, California
Dr. W. W. Suttow, Houston, Texas
Nancy and Robert Talmadge, Willow Creek, California
Mrs. Anna Thomas, Sebastopol, California
Evelyn Wilson, Oakland, California
Miss Phyllis Wilson, Carmichael, California
Mrs. Faye Wolfson, La Jolla, California
Mrs. Lucille Zellers, El Cerrito, California



A.M.U., PACIFIC DIVISION, 17TH ANNUAL MEETING
ASILOMAR, CALIFORNIA JUNE 18-21, 1964



1. Emery Chace, 2. Elsie Chace, 3. John Q. Burch, 4. Dr. S. S. Berry, 5. Dr. Wendell Gregg, 6. Dr. Myra Keen, 7. Lucille Zellers, 8. Mae Dean Richart, 9. Dr. Rudolf Stohler, 10. Crawford Cate, 11. Robert Talmadge, Sr., 12. Mrs. Fred Berg, 13. Ella Louise May, 14. Bertha Finke, 15. Twila Bratcher, 16. Effie Forthun, 17. Mary Long, 18. Dr. Elsa Gonzalez, 19. Kay Gudnason, 20. Evelyn Wilson, 21. Gladys Archard, 22. Jean Cate, 23. Ruth Shasky, 24. Ruth French, 25. Walter Eyerdam, 26. Allyn Smith, 27. Walter Miller, 28. Dr. Albert Mead, 29. George Kanakoff, 30. Mrs. Edward Thomas, 31. Marianna Paulson, 32. Helen Hunt, 33. Mary Larson, 34. Rose Burch, 35. Tamara Loosanoff, 36. Dr. Victor Loosanoff, 37. Irene Franchini, 38. Mead French, 39. Fred Berg, 40. Barry Roth, 41. James McLean, 42. Howard Fletcher, 43. Edgar Halley, 44. Dr. Alan Solem, 45. Camilla Ingram, 46. Phyllis Wilson, 47. Nancy Talmadge, 48. Dr. Edwin Allison, 49. Dr. Joseph Bequaert, 50. William Old, 51. Capt. R. D. Risser, 52. Ray Summers, 53. Ford Bratcher, 54. Eugene Coan, 55. Florence Lafayette, 56. Eva Mae Fletcher, 57. Grace Behrens, 58. Betty Phillips, 59. Priscilla Blesch, 60. Helen Breyman, 61. Dr. William Emerson, 62. Dr. Warren Addicott, 63. Gale Spohn, 64. Dr. Donald Shasky, 65. Dr. Fritz Haas, 66. Lawrence Thomas, 67. Mrs. Joseph Bequaert, 68. Ted Phillips, 69. Buzz Owen.

NEWS, NOTES, NOTICES

The thirty-first annual meeting of the American Malacological Union will be held July 19-23, 1965 at Wagner College on Staten Island, New York. Detailed notices will be mailed to all members about April 1.

This will be the second visit of the AMU to this serene setting, quite apart from the great city and its World's Fair. As before, the New York Shell Club is sponsoring the meeting. Those who recall the pleasant visit of 1955 will wish to repeat it, while newcomers especially are urged to attend.

* * *

The eighteenth annual meeting of the Pacific Division of the American Malacological Union will be held in San Diego, California at California Western University, June 24-27, 1965.

The setting for this meeting is Point Loma, which overlooks both the Pacific Ocean and Mission Bay.

Everyone who is interested in malacology or conchology is invited to attend. Detailed notices will be mailed to members approximately April 1. Non-members of AMU who wish to be notified as to accommodations when final arrangements are made may send their names and addresses together with 50¢ to AMUPD Secretary, Barbara Good, 3142 Larga Ct., San Diego 10, California.

* * *

The National Capital Shell Club has voted to establish an annual award of not less than one hundred dollars, and possibly more, in the nature of a scholarship to a college or university student doing or planning to do graduate work in marine biology, preferably in the field of malacology. The recipient will be selected from seniors of a university or college located within a radius of twenty-five miles of Washington, D. C., or from senior or graduate students whose home residence lies within this area.

Application in the form of a letter should be sent to Mrs. Olive M. Lewis (Secretary, National Capital Shell Club), 9207 48th Avenue, College Park, Maryland 20741; stated should be the applicant's educational training, interests, plans for the future, and whatever else the student may think pertinent. This letter should be endorsed by a faculty member of the biology or zoology department.

Judging of the applications will be based on the student's ability as evidenced by his or her course work, his or her professed interest in the field of malacology, plans for the future in the field of marine biology, and by the financial need of the applicant.

The professional guidance of Dr. Harald A. Rehder, Curator of the Division of Mollusks, U. S. National Museum, Smithsonian Institution, and the other staff members will be available to the committee making the award.

* * *

Richard Winslow Foster, staff member of the Museum of Comparative Zoology and AMU Life Member, died in Rome on September 3. En route to join the research ship *Anton Bruun* in Mozambique, he was stricken with acute appendicitis; antibiotics employed in treatment aggravated chronic asthma which caused his death. He was 45.

On May 27, 1964 the American Malacological Union was incorporated as a scientific, nonprofit-making society under the laws of the State of California.

Since a permanent California address must now be maintained, Dr. Myra Keen has graciously consented to be a permanent member of the required board of three directors; her Stanford University address will officially be that of the American Malacological Union, Inc. By action of the AMU Executive Council the other two directors will be the annually elected AMU President and Vice-President, ex officio.

* * *

Answering some recent questions concerning AMU membership categories and applicable dues:

Regular membership applies to all permanent residents of the Western Hemisphere: North, South and Central America, and the West Indies (including Bermuda). Corresponding membership applies to all who reside outside these boundaries. Life membership (in either category) may be purchased for the equivalent of twenty years' annual dues. Honorary Life Membership (including Life Presidency) is bestowed upon persons singled out for especial honor by the AMU.

Annual dues are as follows: regular members residing in the United States and Canada pay \$3.00 while residents of the West Indies, Mexico, and South and Central America pay \$3.50 because of higher postal rates to those countries. Corresponding members pay \$3.50 which entitles the holder to receive the *Annual Report Bulletin* and to be listed therein, but not to receive notices of annual meetings unless specifically requested. Additional members of the family of any AMU member are entitled to membership for \$1.00 each; such family members will be listed in the *Annual Report Bulletins*. Annual dues for AMU affiliated shell clubs are \$6.00 for which each club is entitled to have published in the AMU *Annual Report Bulletin* a 500-word report of club activities.

Finally, all AMU members (including clubs and institutions) residing in California, Oregon, Washington, Arizona, New Mexico, Utah, Colorado, Nevada, Wyoming, Idaho, Montana, Hawaii, and Alaska are automatically members of the Pacific Division of the AMU and on behalf of that body are assessed an additional fifty cents annually as are those with APO and Navy addresses in the Pacific area.

* * *

The newly adopted AMU Constitution and AMU, Pacific Division Bylaws appearing on pages 60-68 will not appear in subsequent issues of the AMU *Annual Report Bulletin*. Copies may be obtained without cost upon application to the AMU Secretary.

* * *

All AMU members whose dues were not paid by July 1 have been dropped from the roster of those in good standing and their names deleted from the current printed listing.

AMERICAN MALACOLOGICAL UNION

CONSTITUTION

Adopted July 21, 1964

ARTICLE I

Organization and Objective

Section 1.—This organization shall be called "The American Malacological Union."

Section 2.—Its object shall be the promotion of the science of malacology by holding meetings for reading and discussing papers, and for furthering the interests of students and collectors of shells by facilitating acquaintance and co-operation among the members.

ARTICLE II

Membership

Section 1.—Membership in the organization shall consist of the following classifications:

(1) Regular membership, open to persons resident in the western hemisphere, who are interested in the collection and study of mollusks.

(2) Corresponding membership, open to persons ineligible for regular membership because of geographical location.

(3) Life membership, open to those who pay as a lump sum, an amount equivalent to twenty (20) years' current annual dues, with no further annual dues required.

(4) Honorary life membership, recommended by at least ten (10) members in good standing, may be bestowed by unanimous vote of the Council and a majority voice vote of the AMU membership attending an annual meeting upon persons who have made outstanding contributions to malacology. Honorary life membership shall not be limited to AMU members and may not exceed ten (10) at any one time. Honorary life members shall pay no dues or assessments.

Section 2.—Regular and corresponding memberships shall be granted to those making written applications to the Secretary of the AMU. The annual dues will be those specified in the Bylaws.

ARTICLE III

Council and Officers

Section 1.—The government of the AMU shall be vested in a Council, which shall consist of the currently elected officers, all living past presidents, and four (4) councillors-at-large.

Section 2.—The Council shall hold meetings at least annually, usually during an annual meeting of the AMU, to consider questions of policy, administration, and such other matters as may be brought before it. At other times, the Council may meet on call of the currently elected President to consider matters pertaining to the administration of the AMU, or vote on them by mail. Not less than five (5) members of the Council present at any annual meeting shall constitute a quorum for the proper conduct of AMU business.

Section 3.—The officers of the AMU shall be a President, an Executive Vice-President, one or more Vice-Presidents depending on the number of organized Divisions, a Secretary, a Treasurer, a Publications Editor, and four (4) Councillors-at-Large.

Section 4.—The currently elected Chairman of an organized Division shall automatically become an AMU Vice-President.

Section 5.—By unanimous vote of the Council and a majority voice vote of the AMU membership attending an annual meeting, the title of Honorary Life President may be conferred upon any AMU member (normally one who has previously been an AMU President) in recognition of contributions to the AMU and to malacology that are of an unusually outstanding nature. There shall be only one Honorary Life President at any one time. He will hold this title for life and shall pay no dues or assessments.

ARTICLE IV

Geographical Divisions

Section 1.—With the approval of the Council, groups of AMU members in good standing, who live within a specified geographical area, may establish a Division of the AMU for the purpose of organizing and conducting annual regional meetings, or other local meetings, under AMU auspices. Areas covered shall be defined specifically and shall not overlap.

Section 2.—The officers of a Division shall be a Chairman, a Vice-Chairman, a Secretary, a Treasurer, and such other additional officers as the Division may desire, all of whom shall constitute an Executive Board for the purpose of conducting the business of the Division.

Section 3.—A Division shall prepare appropriate Bylaws under which it shall be governed. Such Bylaws shall not abridge or supersede any Article or Section of the AMU Constitution and Bylaws. Division Bylaws, or any subsequent additions or changes in them shall be approved by the AMU Council before becoming effective.

Section 4.—A Division Treasurer shall be empowered to accept AMU membership dues and assessments, and transmit them promptly to the AMU Treasurer along with appropriate lists of names and addresses in duplicate, a copy of which is for the information of the AMU Secretary.

Section 5.—The currently elected Chairman of a Division shall, as an AMU Vice-President, be a voting member at an annual or other meeting of the AMU Council. In the event of inability to attend a Council meeting at which Division representation is necessary or desired, a Division Chairman may delegate his voting rights to a qualified AMU member of the Division in good standing, who is able to attend such a meeting.

ARTICLE V

Shell Club Affiliation

Section 1.—Any locally organized shell club or similar organization, meeting regularly or occasionally for the primary purpose of promoting knowledge of conchology or malacology, may affiliate with the AMU upon application to the AMU Council for its approval.

Section 2.—The annual affiliation fee for such clubs or organizations shall be as specified in the Bylaws.

ARTICLE VI

Amendment Procedures

Section 1.—Any proposal to amend, add, or repeal any Article or Section in this Constitution shall be prepared by a committee, appointed by the currently elected President, for the purpose of drafting necessary or desired changes. Otherwise, such a proposal shall bear the signatures of at least ten (10) AMU members in good standing.

Section 2.—Any such proposal shall be submitted to the President or to the

Council at least two months prior to an annual meeting for verification of its constitutionality. If approved by the Council, the proposal may be discussed at the next annual meeting. Adoption of the proposal, when approved in final form by the Council, shall be by two-thirds majority vote in a mail ballot.

Section 3.—Copies of the approved proposal, along with an appropriate ballot, shall be mailed to all AMU members in good standing by the AMU Secretary as soon as practicable. Approximately one month shall be allowed for the return of ballots. The AMU Secretary shall tally the vote at the end of this period, or the President may appoint a Tally Committee to count the ballots. The result of the vote shall be certified to the Council, who will declare the proposal adopted or rejected as of the date of certification.

ARTICLE VII

Bylaws

Section 1.—The AMU may enact Bylaws interpreting any Article or Section of this Constitution. The procedure for adopting, amending, or repealing any Bylaw shall be as specified in the Bylaws.

BYLAWS

ARTICLE I

Dues, Assessments, and Fees

Section 1.—The annual dues of regular members living in the United States and in other countries having the same as the U. S. domestic postal rates shall be three dollars (U. S.) (\$3.00). The annual dues of other regular members, and of corresponding members shall be three dollars and fifty cents (U. S.) (\$3.50). Any additional person in the family of an AMU member desiring to become a member may join for annual dues of one dollar (U. S.) (\$1.00).

Section 2.—Annual dues shall become payable on January 1 of each year and shall be credited to that year for accounting purposes. Members who are in arrears for more than one year shall be dropped by the Secretary from the list of membership in good standing.

Section 3.—Upon appropriate vote of the AMU members within any geographical area in which a Division is organized, the regular membership dues may be supplemented by an annual assessment in a fixed amount, to be billed, along with annual dues, to all members living within the area covered. An assessment may be changed or rescinded by a similar vote of the members involved. The Council shall approve all assessments before they become effective.

Section 4.—The annual affiliation fee for a local shell club or comparable organization shall be six dollars (\$6.00), payable on January 1. In return for this fee each affiliated club or organization in good standing will be entitled to the publication in an AMU annual Bulletin of a review of its activities and other desired information of a length not to exceed five hundred (500) words. Affiliated clubs in arrears for more than one year shall be dropped by the Secretary from the list of those in good standing. To the extent possible and practicable, affiliated clubs shall place the AMU Secretary on the mailing lists to receive copies of club publications, reports, and notices sent to club members.

ARTICLE II

Council Duties

Section 1.—The Council shall pass on all matters involving AMU policy, administration, and operations, and shall exercise its approval authority

on matters specifically covered in the Constitution and Bylaws. Its decisions shall be subject to ratification by a majority voice vote of the AMU members in good standing who attend annual meetings. The Council shall act in an advisory capacity on all matters brought to its attention by the President.

Section 2.—The annual meeting of the AMU shall be held at such time and place as may be fixed by the Council at the preceding annual meeting.

ARTICLE III

Terms of Office and Duties of Officers

Section 1.—The terms of office of the officers and the councillors-at-large shall normally be one year, beginning one month after election at an AMU annual meeting, except that the Treasurer shall serve beginning on January 31 following election.

Section 2.—The officers shall perform the usual duties of their offices.

(1) The President shall carry the responsibility of organizing and presiding at an annual AMU meeting.

(2) The President shall appoint an Auditing Committee, a Nominating Committee, and such other standing and special committees as he may deem advisable. Such committees shall serve for at least one year, or less as circumstances may require.

(3) The Executive Vice-President shall act for the President if the latter is unable to serve, and shall assist the President on request.

(4) The Secretary shall take all minutes at Council and AMU business meetings, transcribe them as promptly as possible, and transmit a copy to the President for review. The Secretary shall also take notes during AMU meetings such as may be appropriate, obtain abstracts of papers presented, and prepare an annual AMU report, which shall include the reports of Division secretaries, records of action taken by the Council and by the membership in business meetings, lists of regular and corresponding members and of affiliated clubs in good standing, and such other information on AMU activities as may be of interest to the membership. In addition the Secretary shall prepare a special written report covering the activities and expenses of the office during the year, and shall submit an estimate of the probable expenses of the office for the next calendar year to the Treasurer. Until such time as the AMU is financially able to compensate the Secretary properly for services rendered, all reasonable travel and living expenses incurred in attending annual AMU meetings shall be paid from available AMU funds, to be considered part of regular annual meeting expense.

(5) The Treasurer shall be responsible for the proper handling and recording of all AMU funds. He shall receive all dues, assessments, and fees, and shall keep the Secretary currently informed so that up-to-date lists of AMU members and affiliated clubs in good standing may be maintained for publication in annual AMU Bulletins and for other purposes. The AMU Treasurer shall forward all accumulated Division assessments to Division treasurers on a quarterly basis. The Treasurer shall work closely with the Auditing Committee appointed by the President.

(6) Within one month after an annual AMU meeting, the Treasurer shall submit a written financial report of the meeting to the Auditing Committee for approval and transmittal to the newly elected President for review. In addition, not later than January 31, the Treasurer shall submit a written financial report to the Auditing Committee covering the previous calendar year. This report shall include all monetary transactions of the AMU of whatever nature during the year, as well as an account of AMU financial

status as of December 31 of the year. The Auditing Committee shall approve this report before it is submitted to the President and the Council for review, and for subsequent approval by the membership at the next annual AMU meeting.

(7) The Treasurer may make monetary advances from available AMU funds, upon request, to the President, the Secretary, and to the Chairman of organized Divisions to cover some of the initial expenses of organizing annual meetings. Such advances shall be accounted for or repaid as soon as possible after the meetings. Any excess or deficit of income over expense resulting from an AMU annual meeting shall be applied to the organizing costs of future AMU meetings. Treasurers of organized Divisions shall handle profits or losses from annual Division meetings in the same manner. In this connection, it shall be expressed AMU policy that all annual meetings held under its auspices shall pay for themselves each year as nearly as possible from adequate registration fees paid by attending members and guests, and from gifts or other funds donated specifically for meeting purposes.

(8) The Publications Editor shall be responsible for editing all AMU publications, and for arrangements for publishing them. The Editor and the Secretary shall work together as an Editorial Board in developing the format and content of AMU annual Bulletins and other AMU publications. They shall maintain records of printing and distribution costs, separately for each publication, and report on them annually to the Treasurer along with any requested estimates of future publication costs. The Editorial Board may recommend the undertaking of new AMU publications, which shall require Council approval.

ARTICLE IV

Auditing and Nominating Committees

Section 1.—The Auditing Committee, appointed by the outgoing President, shall consist of three members in good standing. This Committee shall keep informed of all financial aspects of the AMU, audit the books and reports of the Treasurer, and act in an advisory capacity when called upon by the Treasurer.

Section 2.—The Nominating Committee shall consist of not less than three nor more than five members of the Council, exclusive of existing officers. They shall prepare a list of officers and councillors-at-large for the ensuing year, present it at a Council meeting for review and approval, and then submit it to the membership attending an annual meeting, where a majority voice vote will determine election. In the event candidates are nominated from the floor at the annual meeting, election shall be determined by written ballot mailed by the Secretary to all AMU members in good standing, to be returned within one month from the date of mailing. Officers shall be declared as elected upon certification of the results of a majority of the ballots by the Secretary, except that if a Secretary be nominated from the floor, the President shall appoint a Tally Committee to count ballots and certify the result. Membership in good standing in the AMU for a period of not less than two immediately prior years shall be an eligibility requirement for the nomination for any AMU office. No eligible AMU member shall be nominated for any office without prior consultation on a willingness to serve.

ARTICLE V

Amendment to Bylaws

Section 1.—Any proposal for the addition, amendment, or repeal of any Article or Section of these Bylaws shall be handled and voted on in the same manner as provided in Article VI of the Constitution.

AMERICAN MALACOLOGICAL UNION

PACIFIC DIVISION

BYLAWS

Adopted July 21, 1964

ARTICLE I

Section 1.—Organization. This organization shall be known as the American Malacological Union, Pacific Division, and as such is an integral part of the national organization, The American Malacological Union.

Section 2.—Purpose. The purpose in forming the Division is to give members of the American Malacological Union living in the Pacific area opportunity to attend annual regional meetings.

Section 3.—Pacific Division area. The geographical area covered by the Pacific Division shall be bounded on the south by the Mexican border, on the north by the Canadian border, and on the west and east, in general, by the 170th and 105th meridians, except that Guam and all of the states of Montana, Wyoming, Colorado, and New Mexico shall be included, with Texas excluded. This area shall hereinafter be referred to as the Pacific Division area. AMU members with A.P.O. and Navy addresses in the Pacific shall be included in this area.

Section 4.—Administration. For purposes of administration, the Pacific Division shall consist of its officers and the standing and interim committees appointed to carry on the business of the Division.

Section 5.—AMU Constitution and Bylaws. No provision in these Bylaws shall be interpreted as superseding or abridging any provisions in the Constitution and Bylaws of the national organization.

ARTICLE II

Section 1.—Executive Board. The administration of the affairs of the Division shall be vested in an Executive Board, which shall consist of the currently elected officers and the three most recent and available past Chairman of the Pacific Division. Its Chairman shall be the current Division Chairman.

(1) The terms of members of the Board, exclusive of Division officers, shall be one year beginning one month after the close of the annual meeting. The terms of officers shall be those specified in Section 5 (1) of this Article.

(2) Vacancies on the Board may filled through appointment by the Chairman, preferably from among previous Chairmen.

(3) No person shall be a Board member who has not been a member in good standing of the American Malacological Union for at least two preceding consecutive years.

Section 2.—Executive Board meetings. The Board shall meet annually during a Division annual meeting, prior to the regular business meeting, and at such other times as agreed upon by a majority of the Board. Insofar as possible, matters requiring action between Division annual meetings shall be handled through a poll of the Board by the Chairman.

Section 3.—Annual Division meetings. The time and place of the annual Division meeting shall be decided by the Board.

Section 4.—Executive Board authority. The Board shall pass on all matters involving policy, but its decisions are subject to ratification by a majority vote of the AMU members in good standing attending an annual meeting, who are in the Pacific Division area.

Section 5.—Division officers. The officers of the Division shall be a Chairman, a Vice-Chairman, a Secretary, an Assistant Secretary, a Treasurer, and an Assistant Treasurer.

(1) Terms of office of these officers shall normally be one year, beginning one month after election at an annual meeting, except that the Treasurer and Assistant Treasurer will serve for a calendar year beginning January 31 following their election.

(2) Whenever an annual meeting of the national organization is held within the Pacific Division area, the currently elected Division officers and Executive Board members shall serve for a second year without re-election.

Section 6.—Duties of officers. The officers shall perform the usual duties of their offices.

(1) The Chairman shall preside at annual meetings and be generally responsible for the activities of the Pacific Division. He shall appoint an Auditing Committee, a Nominating Committee, and such other committees as he deems desirable. He shall, as a Vice-President of the AMU, act as liaison with the officers and the Council of the AMU, either personally or by delegation of authority to a qualified member of the AMU in the Pacific Division area.

(2) The Vice-Chairman shall act for the Chairman if the latter is unable to serve, and shall assist the Chairman on request.

(3) The Secretary shall take all minutes of Executive Board and business meetings, transcribe them as promptly as possible, and transmit a copy to the Chairman for review. The Secretary shall also take such notes during annual meetings as may be appropriate, obtain abstracts of papers presented at annual meetings, prepare an annual report of the Pacific Division meeting, and submit this report to the Chairman for his review and for transmittal to the AMU Secretary for inclusion in the AMU Annual Report. The Secretary shall also handle all necessary correspondence, as directed by the Chairman or as otherwise required, keep the other members of the Executive Board informed on matters that concern them, and maintain the records of the Division.

(4) The Assistant Secretary shall be responsible to the Secretary and shall handle such reasonable secretarial duties as the Secretary may assign in order to provide for an equitable division of the secretarial load.

(5) The Treasurer shall be responsible for handling and recording all incoming and outgoing funds of the Pacific Division. He shall receive such AMU dues and Division assessments from regular and new members as may come to him and shall forward them promptly to the AMU Treasurer. He shall keep an up-to-date list of the AMU members within the Pacific Division area who are in good standing, based on the list maintained by the AMU Treasurer, and shall keep the Division Secretary informed of the current status of this list.

(6) Within one month after the annual meeting the Treasurer shall submit a financial report of this meeting to the Auditing Committee for approval and transmittal to the newly elected Chairman for review. In addition, not later than January 31 following the annual meeting, he shall prepare and submit a final calendar-year financial report to the Auditing Committee, which shall include all monetary transactions of the Division during the year.

(7) The Auditing Committee shall consist of three qualified AMU members in the Pacific Division area, appointed by the outgoing Chairman. This committee shall approve all financial reports prepared by the Treasurer before they are submitted to the newly elected Chairman for review. Subsequent approval shall be obtained at the next annual Division meeting from

the Executive Board and by majority voice vote of the AMU members attending this meeting.

(8) The Assistant Treasurer shall be responsible to the Treasurer and shall handle such reasonable financial duties as the Treasurer may assign in order to provide for an equitable division of these duties.

Section 7.—Nominating Committee. Candidates for Division offices shall be nominated by a Nominating Committee of three, appointed by the Chairman from the list of past Chairmen. The Committee shall present its slate of nominations at the annual business meeting. Election may be by majority voice vote, but if there is more than one candidate for an office a majority vote by written ballot will determine election.

(1) No candidates shall be nominated without prior consultation as to their willingness to serve.

(2) AMU membership in good standing in the Pacific Division area for a period of not less than two immediately preceding consecutive years shall be required as eligibility for officer candidates.

(3) If a written ballot is required, the Chairman shall appoint a Tally Committee, apart from nominated officers, to count ballots and certify the result.

ARTICLE III

Section 1.—Membership. Classes of membership in the Pacific Division area of the AMU will be those specified in the AMU Constitution and By-laws.

Section 2.—Award of Honor. An AMU-Pacific Division Award of Honor is hereby established, to be conferred in recognition of outstanding accomplishments or contributions in the fields of conchology or malacology.

(1) Not more than one such Award shall be conferred in any one year, nor shall one necessarily be conferred each year. Two or more members of a family working together may receive an Award jointly.

(2) Nominations for an Award, accompanied by suitable documentation, shall be submitted in writing to the Executive Board, signed by not less than five AMU members in good standing in the Pacific Division area, before January 1 of the year in which the Award is to be conferred. The Board must approve the nomination in writing and present it formally at a Pacific Division annual meeting for final acceptance by majority vote.

ARTICLE IV

Section 1.—Dues. Annual membership dues will be those stated in the Bylaws of the AMU.

Section 2.—Assessment. An additional amount may be assessed by written ballot majority vote of the AMU members in good standing in the Pacific Division area after approval by the Executive Board and favorable action on a motion to refer the question to the appropriate members in an annual meeting. Upon approval, the assessment shall take effect on the following January 1. Any assessment may be changed or rescinded by a similar course of action. The current assessment shall be fifty cents (\$0.50) per member.

(1) Any Pacific Division assessment shall be based on the current list kept by the Division Treasurer as provided in Article II, Section 6 (5) of these Bylaws and shall be billed, in addition to regular AMU dues, by the AMU Treasurer.

(2) The Pacific Division assessment shall be used for the purpose of promoting and handling annual meetings and for such other purposes related to the administration of the activities of the Pacific Division as may be approved by the Executive Board.

Section 3.—Costs of annual meetings. In the handling of annual meetings of the Division the intention shall be to cover all legitimate costs by any or all of the following means: (1) A registration fee to be paid by all AMU members, except Honorary Members, and guests attending, in an amount established by the Chairman after consultation with the Division Treasurer; (2) an assessment, as covered in Section 2 of this Article; (3) donations or gifts of funds from AMU members and friends, or from other sources; and (4) loans from the AMU.

(1) Any excess income over expenses attributable to an annual meeting shall be retained in a special account by the Division Treasurer, to be allocated against the expenses of subsequent meetings; likewise, any deficit shall be carried over and covered, to the extent practicable, by subsequent registration fees or other applicable funds for annual meeting expenses. All loans or advances from the AMU for handling Pacific Division annual meetings shall be repaid as promptly as possible.

ARTICLE V

Section 1.—Amendments. Any proposal to amend, add, or repeal any By-law of the Pacific Division shall be prepared by a Bylaws Committee appointed by the Chairman for the purpose of drafting necessary or desired changes. Otherwise, such a proposal must bear the signatures of at least ten AMU members in good standing in the Pacific Division area.

(1) Any such proposal shall be submitted to the Chairman at least two months before an annual meeting of the Pacific Division for referral to the members of the Executive Board for their consideration and for verification of constitutionality. If approved by the Executive Board, the proposal may be discussed at the next annual meeting. If no objection is raised in open meeting, the proposal may be adopted by a two-thirds majority vote of the AMU members in good standing in the Pacific Division area, who are in attendance. If objection is raised by any such member, the proposal will be carried over for adoption or rejection by a similar vote at the next succeeding meeting of the Pacific Division.

(2) The vote to adopt or reject any proposed changes in these Bylaws may be based on the proposed changes as a whole, or separately on changes in individual articles or sections that are contained in the proposal.

AMERICAN MALACOLOGICAL UNION

MEMBER SHELL CLUBS

COASTAL BEND SHELL CLUB, Joan Howie, Secretary: The Coastal Bend Shell Club of Corpus Christi, Texas meets at 8:00 P.M. the fourth Tuesday of each month. We have 27 regular and four honorary members, and these officers served in 1963-1964:

President, Mrs. Joseph Weigand; Vice-President, Mr. Carl Young; Treasurer, Mrs. Fred Jones; Recording Secretary, Mrs. George Howie; Corresponding Secretary, Mrs. J. Roy Taft.

These were the highlights of the past year's activities:

A large collection of local shells was mounted for display in the new branch city library. A shell show was held in the spring to which both local and out-of-town collectors brought exhibits; these were judged and ribbons awarded in the various categories; plans are being made for a larger and improved show next year. Boxes of the common shells of the area were prepared and labeled for sale to museums in Texas and through the Corpus Christi Chamber of Commerce to tourists and convention guests. The money from the sale of the shells will help furnish the shell room in the proposed new Corpus Christi Museum. Club members and the local Museum Guild have cooperated in teaching classes in shell collecting and beach combing for the schoolchildren and for tourists, and aided the Museum in planning a field trip to the Gulf beaches when the Mountain-Plains Museum Directors convention was held in Corpus Christi. A scientific checklist is being prepared for local shells; this, which includes microscopic species, should aid both amateurs and experienced collectors.

The Corpus Christi Museum was fortunate in securing a collection of shells from Yokosuka, Japan—Corpus Christi's "Sister City." The Coastal Bend Shell Club had sent a collection of local shells to the Japanese city a year ago, and these shells were a return gift. They are from Tokyo Bay, Sagami Bay, Okinawa and Formosa areas, and among them are many very rare shells. Our club president, Mrs. Weigand, who is also a member of the Sister City Steering Committee, presented the Japanese shells to the Mayor of Corpus Christi. He in turn presented them to Mr. Albert Heine, Director of the Corpus Christi Museum; the shells are on display in the Museum at the present time.

SANIBEL—CAPTIVA SHELL CLUB: Officers: President, Mrs. Mary Aleck (Sanibel); 1st Vice-President, Mrs. Harvey Meyer—formerly Maude Nickerson—(Captiva); 2nd Vice-President, Mrs. Tom Nix (Sanibel); Recording Secretary, Mrs. Carol Lee (Sanibel); Corresponding Secretary, Mrs. John P. Glass (Sanibel); Treasurer, Mrs. Paul Kearns (Sanibel).

Meetings are held on the third Monday evening of each month, alternating between the Sanibel and Captiva Community Houses. Speakers the past year have included Dr. William J. Clench of Harvard; Dr. R. Tucker Abbott of Philadelphia; Mr. Harold H. Harrison, writer and photographer for the *National Geographic* and other periodicals; Mr. Harvey Meyer, Professor Emeritus of the University of Tennessee; Frank and Alys Wilmore of Mobile, Alabama, who transported us to the Red Sea and the Persian Gulf via their marvelous slides. We have had informal open forum meetings when away from home shelling was discussed and hilarious experiences related. Beautiful specimens

of shells from the Barrier Reef, the Bahamas, the Caribbean, Ocracoke, North Carolina, and the Florida Keys were shown.

This year at the third annual shell count one hundred shellers participated, and 165 species were turned in; twelve had not been on the previous lists.

The club's most important undertaking this year and every year is planning and supervising the Shell Exhibit (categories, placement, rules, etc.) for the annual Sanibel Shell Fair; sponsored by the Sanibel Community Association, it is held the first Thursday, Friday, and Saturday in March each year at the Community House.

We believe this is the oldest (27 years) shell show in the country. At the 1962 Shell Fair there were 67 entries; in 1963, 140; and in 1964, 264 adult entries and 38 schoolchildren's exhibits. These last were self-collected, self-arranged, and self-identified, all beautiful and interesting. The Live Shell Show is also under the sponsorship of the Shell Club; here visitors have the opportunity to see living mollusks common to the Islands in their natural habitat.

For the second year a trophy has been awarded by the Academy of Natural Sciences of Philadelphia for the most outstanding mollusk exhibit of the Fair. Looking back into the history of these shell shows we learn that Mr. and Mrs. Henry Ford and Mr. and Mrs. Thomas A. Edison were former visitors.

Other activities have included arranging entertainment and field trips for visiting scientists, filling shell boxes for the Ft. Myers Chamber of Commerce, and arranging display boxes of fine shells for the "rolling showcase of Florida." We have printed and distributed 24,000 copies of our "Handbook" on conservation. Many other things—never a dull moment!

CONNECTICUT SHELL CLUB, Sheldon G. Morris, Secretary: Our monthly meetings are held at 8:00 P.M. the second Friday of each month at the Peabody Museum in New Haven. At any meeting members are welcome to exhibit shells or to informally discuss any matter which may be of interest to other members. Usually there is a featured speaker but if not, President Morris, who is a member of the Peabody Museum Staff, rounds out the program by exhibiting shells or other marine material from the museum collection.

A project in which the club is engaged is aiding the Peabody Museum in building up a collection of the terrestrial and freshwater mollusks of Connecticut.

Our officers: Percy A. Morris, President; Mrs. Clifford Thompson, Vice-President; Secretary, Sheldon Grippin Morris; Treasurer, William Tuthill.

PALM BEACH COUNTY SHELL CLUB, Mrs. Ward Brown, President: Our meetings are held throughout the year on the first Friday of each month at the Strait Museum in Lake Worth, Florida—8:00 P.M. the time. We have a membership of about 150 from all over the United States and several foreign countries; this includes 10 junior members.

When the tides allow we schedule a monthly field trip; during the winter when we have no low tides on the east coast we hold fossil trips. On November 30 (1963) we had a field trip to Marco Island which was most fruitful. Our custom is to hold two auctions each year which always bring record attendance since many worthwhile items are donated. Our fifth annual shell show was held February 25–29 and was an outstanding success. Judges were Dr. Gilbert

Voss, Professor Donald Moore, and Dr. Frederick Bayer, all of the University of Miami's Marine Laboratory; the Academy of Natural Sciences of Philadelphia provided an award which went to Virginia Lee for her exhibit of *Murex pomum*.

Mrs. William Hughes and Col. Corinne Edwards have set up an excellent display of Florida shells at the Lake Worth South Grade School and the club helped materially in arranging the display currently at the Junior Museum of Palm Beach County. At the show this year one teacher brought her entire third grade class to see and learn; we feel that we are progressing in our aim of interesting young people in the study of the marine life at their doorstep. One of our members, John Proetz, has recently taken up photography and treated us to several programs of his beautiful color studies of world shells. Mr. and Mrs. George Raeihle of New York visited us and showed their color pictures of live shells to an impromptu but enthusiastic audience.

LONG BEACH SHELL CLUB, Mrs. S. Ralph Hall, President: Our club now in the 26th year meets at the Long Beach (California) Y.M.C.A. at 2:00 P.M. on the second Sunday of each month—there is no meeting in July.

Programs for the past year included: Basic Studies in Mollusks, featuring beautiful and extensive displays of shells together with pictures of shelling places enjoyed by members; The Strange and Wonderful World of Limpets, S. Ralph Hall; Mites, by Mrs. Crawford N. Cate, who specializes in this family; Fiji, Mr. Jess Gilbert; Shell Collecting at San Felipe, Baja California, Mrs. Michael O'Brien; SCUBA and Shell Collecting, Mr. Sam Miller, diving instructor; Science of the Sea, Mr. Dan Ryan, a teacher; Things a Beginner Collector Wants to Know, Mrs. Bradley Weyman and Mrs. Bernadine Hughes.

A very enjoyable club field trip to Cabrillo Beach at midwinter low tide produced many fine specimens. We display annually at the Long Beach Hobby Show. The club has an annual shell auction in which members and their friends participate. This is the main financial sustenance of the club since our dues are but one dollar per year.

Current officers: Mrs. S. Ralph Hall, President; S. Ralph Hall, Program Chairman; Mrs. Bernadine Hughes, Recording Secretary; Mrs. Robert Weyman, Corresponding Secretary; Miss Frances Bellman, Treasurer; Mrs. Eugene Wilkins, Librarian.

NORTHERN CALIFORNIA MALACOOZOLOGICAL CLUB, Mary Larson, Recording Secretary: This year has been most important to us. Due to the increasing scientific stature of our publication *The Veliger*, and the fact that our club membership is very well balanced between amateur and professional scientists, it has been decided to turn over publication of *The Veliger* to a scientific group organized solely for that purpose. We are very proud that "our baby" has matured, so to speak; many of us are members of both organizations.

We meet in room 4005 of the Life Sciences Building on the University of California campus in Berkeley at 8:00 P.M. on the first Tuesday of each month. We are always happy to welcome visitors and invite all shellers who may be in our area to attend our meetings. Usually we have a main speaker with a theme of scientific interest; during intermission there is time to examine any exhibit which may have been set up and to make shell exchanges. Then follows a brief business meeting and another talk by one of our mem-

bers. One of the highlights of the past year was the report of Mr. Allyn G. Smith of his part in the recent scientific expedition to the Galápagos Islands. We also had the pleasure of being behind-the-scenes guests of the Steinhardt Aquarium.

Officers for 1964: President, Mae Dean Richart; Vice-President, Frank Carrus; Membership Secretary, Laura Burkhardt; Corresponding Secretary, Verna Wegner; Recording Secretary, Mary Larson; Treasurer, Phoebe Balch; Director-at-Large, Dr. Cadet Hand.

SANTA BARBARA MALACOLOGICAL SOCIETY, John Phillips, President: We meet the third Thursday of each month at the Santa Barbara (California) Museum of Natural History at 7:30 P.M. Our current officers: President, John Phillips; Vice-President, Jack Brookshire; Recording Secretary, Miss Ella Louise May; Treasurer and Acting Corresponding Secretary, Mrs. Georgia Smith.

Activities of the past year:

Eight members attended the annual meeting of the AMU Pacific Division at Pacific Grove, California.

Club members have been donating local species of mollusks to the elementary school system and to Santa Barbara City College.

The Society took part in the local annual hobby show, exhibiting many extremely fine shell collections which were hailed by residents as well as out-of-town visitors as an outstanding contribution.

A club library was started with subscriptions to three malacological publications; these periodicals may be checked out to members for a one-month loan at each meeting.

A very productive field trip to the Morro Bay area was enjoyed, many fine mollusks collected.

The club sponsored an AMU membership for Dr. E. Rios of Rio Grande, Brazil, one of the noted conchologists of that country; he repaid the favor by sending back some very fine *Voluta* from the Brazilian coast.

A successful shell auction was held in February; many rare shells were auctioned off by both a silent and an old-time voice auction.

The club is making display cases for the local schools and public buildings in which attractive mollusks will be displayed.

NEW YORK SHELL CLUB: Meetings convene at 2:00 P.M. on the second Sunday of the month, September through June, in the American Museum of Natural History, New York City. The current officers: President, William E. Old; Recording Secretary, Marian Schroth; Corresponding Secretary, Grace McDougall; Treasurer, Mathilde Weingartner; Historian, Nick Katsaras. Present membership count is approximately 250. Both local and corresponding members receive the "New York Shell Club Notes," a mimeographed paper (averaging eight pages) under the editorial management of Dorothy Raeihle, Anthony D'Attilio, and M. Karl Jacobson. The "Notes" contain reviews of current literature, news items, summaries of presentations, studies of both local and worldwide species.

The meeting programs are varied, including both scientific and popular presentations. The "Shell-of-the-Month," a short feature, emphasizes a member's individual interest or observation of a species; the "Question Box"

affords the opportunity to have a wide range of puzzling items cleared by answer and/or discussion from the floor.

In addition to the many excellent presentations by members this past season, we were fortunate to have as guest speakers Dr. R. Tucker Abbott, who described his expedition to the Bay of Bengal, and Richard W. Foster, who told us of his experiences while shelling in the Cook Islands in 1962.

The club's most ambitious project of the year was an auction of shells and related items to raise funds toward the establishment of an exhibit of New York shells in our American Museum of Natural History. We are proud of the cooperation of our members in making the project most successful. At present we are working to assemble a Club Library, which is to be housed in space kindly allotted to us by the Department of Living Invertebrates.

We are looking forward to another lively season in 1964-1965, to be culminated by the New York Shell Club playing host to the delegates of the American Malacological Union at their annual meeting July 20-23, to be held at Wagner College Campus on Staten Island.

BROWARD SHELL CLUB, Jean Redding, Corresponding Secretary: In March, 1964 the Broward Shell Club observed its second birthday and elected the following officers:

President, Dik Jones; Vice-President, Klaire Fenko (Junior Member); Recording Secretary, Mrs. Alice Warlow; Corresponding Secretary, Mrs. Jean Redding; Treasurer, Mrs. Mary Ingalls.

Regular monthly meetings are held on the second Wednesday, 8:00 P.M., at the Cypress Plaza Community Center in Pompano Beach, Florida. Annual events include a picnic, shell auction, and birthday and Christmas parties. Plans are under way for the first Shell Show to be held February 19-21, 1965 in Fort Lauderdale; Dr. William J. Clench will be one of the judges.

The official emblem of the club has been established as *Busycon contrarium* and will be featured on decals now being printed.

Shell-of-the-Month discussions over the past year have covered *Pecten ziczac*, *Barnea costata*, *Strombus gigas*, *Melongena melongena*, *Xenophora conchyliophora*, and *Cardium robustum vanhuyningi*, all illustrated with member-collected specimens.

Members reported on trips made to Colombia, South America, Sanibel and Marco islands, and to Cayman Brac, Cayman Islands, where specimens were collected for Dr. William J. Clench's "Johnsonia" records.

Programs over the year have included these movies: "Pearlers"; "Coral Wonderland"; "Beachcombing on a Coral Isle"; underwater movies of the area from Palm Beach to the Florida Keys, and slide programs showing Australian shells, the family Volutidae, individual collections and slides taken on occasion of the various shell hunts arranged by the club.

Shell hunts were made at Peanut Island in Palm Beach County, to South Bimini, to Bahia Honda Key, and a fossil trip to Belle Glade.

A list of the shell reference books owned by members is kept by the club president since local libraries do not have adequate reference material. A question box has been established and a committee for identification helps members identify their shells. An excellent Annual Report is published each year and distributed to members at the annual March meeting.

SOUTH FLORIDA SHELL CLUB, Leonard Parent, Recording Secretary:

We are affiliated with the Museum of Science and Natural History (Miami) and meet at the Museum at 8:00 P.M. on the fourth Monday of each month (no meeting in December). Our officers are:

President, Norris McElya; Vice-President, Elizabeth Dupuis; Secretary, John Baker; Treasurer, Corinne Edwards; Historian, Ann Ashworth; Recording Secretary, Leonard Parent.

Our annual shell show held in March was a huge success; in addition to ribbon winners, special silver awards were made to Fran Hutchings, Ellen Grovo, and Ray Lyles. Dr. Gilbert Voss of the University of Miami and Robert Work of the University's Marine Laboratory were this year's judges.

Two of our hard-working members, Rita and Harry Sturgeon, returned from the Sanibel-Captiva Shell Fair with the coveted Philadelphia Academy award for their Pectinidae entry. Then just to show that it was no accident, they brought from the Jacksonville Shell Show the same award for their fabulous entry in the educational group.

Our monthly meetings usually consist of a Shell-of-the-Month talk by one of our members and a program by a guest speaker. Some of the shells covered by members were: *Tellina*, Elizabeth Dupuis; *Strombus alatus*, Elizabeth Frantz; *Epitonium*, Eleanor Leeman; *Liguus*, Dottie Symonds and Fran Hutchings; *Murex cabritti*, Leonard Parent; *Cypraea*, Ellen Crovo. Ellen is chairman of our research committee and is compiling data on *Cypraea cervus* and *C. zebra* which are forwarded to William Old in New York and to Dr. Abbott in Philadelphia. Two gentlemen who have kept us abreast of the activities of the University Marine Lab are Robert Work and Lowell Thomas; they have shown us many slides and preserved specimens dredged from the M.V. *Gerda*.

Field trips have been fairly numerous but were mostly in small groups. Several excursions were made by swamp buggy to the Florida Everglades by which fine specimens of *Liguus* were added to our collections. Marco and Peanut islands have been invaded often, and Bear Cut is practically our headquarters. Many of our members are taking boat trips and snorkeling the reefs with considerable success. A new type of field trip has been inaugurated by Hilda and Bill Welch: twelve people charter a 65' motor vessel for a two-day, two-night trip to several islands in the Bahama group. Our Treasurer, Col. Edwards, most aptly describes such a trip: "We had a ball!"

We now issue a monthly newsletter; it has been named "The Mollusk Chaser." Two television programs presented by our members have generated considerable public interest. We continue to present a certificate and cash award to the best shell exhibit in the South Florida Junior Science Fair.

BOSTON MALACOLOGICAL CLUB, Barbara S. Crowley, Secretary: Eight monthly meetings are held at the Museum of Comparative Zoology in Cambridge, Massachusetts on the first Tuesday evening of the month, October through May. Our total membership is 93; Dr. William J. Clench was elected to Honorary Life Membership this year.

Officers for 1963-1964: President, Mrs. Kay Lawrence; Vice-President, Dr. Kenneth Read; Secretary-Treasurer, Mrs. Barbara S. Crowley; Executive Committee, Miss Carol A. Martin and Mr. Henry Cutler; Conchological Recorder, Miss Vida C. Kenk.

Members and guests have enjoyed the following programs: "Expedition to the Bay of Bengal," Dr. R. Tucker Abbott; "The Family Volutidae," Dr. William J. Clench; "Collecting in the Gulf of California—From Shore to Abyss," Dr. Robert Parker; "Field Trip to New Brunswick," Miss Vida C. Kenk; "Trip to Cocos-Keeling Atoll," Mrs. Virginia Orr Maes; "Teredos," Dr. Ruth D. Turner. We were conducted on a tour of the Museum and the Mollusk Department by the Museum staff, and as a club "first" held an auction of shells donated by our members. This last contributed substantially to our "Speaker's Fund." We continued to enjoy talks by fellow members on a selected New England Shell-of-the-Month; Miss Vida Kenk keeps us informed on the latest books and publications on mollusks as they are received in the Museum library. In June a field trip was held at Halibut Point, near Rockport, Massachusetts; thus ended another enjoyable year.

Visitors are always welcome; do stop in and visit with us, should you be in this area.

YUCAIPA SHELL CLUB, Kate St. Jean, Secretary: At the invitation of Mrs. Howard Fletcher 22 persons interested in shells met at her home in Redlands, California in July, 1962. Mrs. Fletcher, Mr. Louis Mousley, Mr. and Mrs. Harry Turver, and Dr. S. Stillman Berry explained briefly the purpose and benefits of a shell club, and those present decided unanimously to organize such a group. Mrs. Fletcher was asked to serve as chairman until an election could be held; it was decided to meet on the third Sunday of each month at 2:30 P.M. Then each person introduced himself and told of his particular interest.

At the election in November Mrs. Fletcher was elected President, Mr. Louis Mousley Vice-President, Mrs. Kate St. Jean Secretary, and Miss Bessie Falconer Treasurer. A constitution was adopted and the annual dues set at one dollar. The name Yucaipa Shell Club was decided upon.

For the first eleven months of its existence the club met at the homes of members; in May the Mousleys completed their very beautiful museum with its well-equipped and attractive club room and there the shell club has met since.

Membership of 33 has been drawn from a wide area: Beaumont, Yucaipa, Barstow, Calimesa, Redlands, San Bernardino, Banning, San Pedro, and Palo Alto. We have three Honorary Members: Dr. S. Stillman Berry, Dr. Myra Keen, and Mr. John Fitch.

Programs have been varied and interesting; at each meeting all are urged to bring any pertinent information to share, perhaps an article, personal collecting experience, or an interesting shell.

Our Honorary Members have all given us interesting talks; Dr. Berry twice—one time on *Chitons*, the other on the life of Dr. Richard B. Hinds who named our club's shell emblem, *Ferreria belcherii*. Mr. Fitch told of otoliths and another time described trips to the Gulf of California; Dr. Myra Keen told of her discovery of the bivalve gastropod in Baja California. Several others, both members and nonmembers, have entertained and instructed us.

Members take turns acting as hosts, and light refreshments are served following the meetings.

NATIONAL CAPITOL SHELL CLUB, Mrs. Olive M. Lewis, Secretary: The National Capitol Shell Club began its fourth year's activities with Mrs. Carl I.

Aslakson as President; Cmdr. Wesley Thorsson, Vice-President; Mrs. Olive M. Lewis, Secretary; Mrs. George C. Rickard, Treasurer; and Dr. Harald Rehder and Dr. Joseph Rosewater, Members-at-Large. Meetings are usually held on the fourth Thursday from September through May at 8:15 P.M. in Room 43 of the Museum of Natural History, 10th and Constitution Avenue, N.W., Washington, D. C.

The programs for the 1963-1964 year included "Collecting Live Gastropods on Amelia Island, Florida" by Mr. Norman Meese; "Collecting in the Caroline Islands of the Pacific" by Mr. Richard Hagameyer; "Collecting in Hawaii" by Dr. James Kiser and Cmdr. Wesley Thorsson; "Caribbean Shells of the Wading and Snorkeling Zone" by Dr. and Mrs. John W. Parsons of Baltimore; a seven-member panel discussion on "Collecting in Florida"; a movie, "The Silent World," featuring Jacques-Cousteau; and the highlight of the year, "Collecting in the Bay of Bengal," by Dr. R. Tucker Abbott. Most of the talks included color slides or movies.

October and April shell auctions were held to raise money for an annual scholarship award for graduate study in marine biology, preferably in malacology. The first award—\$150.00—was made to Miss Gail Mackiernan, who will do graduate study at William and Mary College this fall.

Officers for the coming year are President, Dr. Joseph Rosewater; Vice-President, Mr. Norman Meese; Secretary, Mrs. Olive M. Lewis; Treasurer, Mrs. George C. Rickard.

HAWAIIAN MALACOLOGICAL SOCIETY, Clifton S. Weaver: This is a short history of our club as it appears in the 1964 Shell Fair program:

The Hawaiian Malacological Society was organized in October, 1941. Following the organization meeting came a break in its history due to the outbreak of World War II. In October, 1946, the Society was revived due largely to the efforts of Charles A. (Chuck) Allen, who was one of the charter members. Since that date, it has met regularly on the first Wednesday of every month at the Aquarium.

The late Wray Harris, conchologist at the Bishop Museum when he died, was elected its first President in 1941. His widow, Mrs. Anna Harris, Clifton S. Weaver, Dr. C. A. Burgess, and Charles A. (Chuck) Allen, all charter members, still belong to the Society.

Since an interest in shells (land, freshwater, or marine) was the only qualification for membership, some 550 persons, collectors from all over the world, belong to it, slightly over 100 of them living in the Hawaiian Islands. The dues have ranged from \$1 per annum at the beginning to the present \$4 a year. Every member gets a copy of the publication of the Society without extra charge.

The Society's publication is the "Hawaiian Shell News," first started in March, 1952. This publication was, at first, a mimeographed paper, but on January 1, 1960, it changed to an offset printed paper carrying many photographs.

The Society made its first bid for public attention at the State Fair in 1952, at which more than 20,000 people visited the booth which the Society paid for. The first Shell Fair as such was held in October, 1957 and was a tremendous success. Since then, the Society has held a Shell Fair at approximately 18-month intervals and this brief history will be distributed at its 1964 fair.

The Society made one brief effort at the publishing game. In 1961, it published "Helpful Hints to Beginning Shell Collectors." In this publication, some dozen local collectors discussed as many different phases of the shell-collecting hobby.

Although there has been some recent discussion in favor of such action, the Society is not incorporated, but from its past history and its present activities, it is a continuing body nevertheless and bids fair to remain so indefinitely.

THE PHILADELPHIA SHELL CLUB, Freda S. Knauer, Corresponding Secretary-Treasurer: Meetings are held the second Thursday of each month, September through May, at 8 P.M. (classes on Mollusca—7:45 P.M.) at the Academy of Natural Sciences, 19th Street and the Parkway, Philadelphia, Pa. Visitors are always welcome.

Membership for our ninth season was 221. Officers elected for 1964-1965: Honorary Life President, H. B. Baker; President, Robert J. L. Wagner; Vice-President, Ronald D. Loudon, Jr.; Corresponding Secretary-Treasurer, Freda S. Knauer (925 Collenbrook Avenue, Drexel Hill, Pa.); Recording Secretary, Patricia D. Henkels; Historian, R. Tucker Abbott; Councillors, Minerva Buerk, Ruth Ostheimer, Warner Over, Leonard Richardson, and Charles Wurtz.

The 1963-1964 season's programs included Richard Foster from the Museum of Comparative Zoology at Harvard, who presented a most interesting illustrated program entitled "The Sundial Shells"; Dr. Joseph Rosewater of the Division of Mollusks, U. S. National Museum, on the Expedition for Mollusks aboard the *Te Vega* to the Malaysian area; Dorothy and George Raeihle, active members of the New York Shell Club, a beautifully illustrated program, "Capturing Mollusks Alive on Slides"; our Past President, Leonard Richardson, who discussed land snail collecting and snail calling; and Dr. Jose Juan Parodiz, Carnegie Museum of Pittsburgh, on "Malacologists of the Past and Present."

In addition to these outstanding programs, activities include the continuation of Dr. Robertson's classes on mollusks, extension of shell-exchange project, monthly reviews of literature on mollusks, our annual Christmas Party (showing of underwater color film, "The Silent World"), a field trip to the South Jersey Shore, and our annual donation auction (netting \$321.20).

Back numbers of the "Proceedings" are available at \$1.00 per copy, plus postage.

ST. PETERSBURG SHELL CLUB, Annabel Wetzel, Corresponding Secretary: Our 1963-1964 meetings were held on the second and fourth Friday of each month, October through April, at the Florida Presbyterian College.

Program for the year as follows: "Housing the Shell Collection," Dorothy Hanssler; "What's Inside a Shell?" Dr. John C. Ferguson, Florida Presbyterian College; "The Chambered Nautilus," Lulu Siekman; "The Art of Cleaning Shells," Irma Sehner; "The Story of a Shell Doll," Emma Hanssler; "Preparations for Shell Showing," Mina Slinn; "Romance of Seashells," Patricia Torrance; "Beachcombing on a Coral Isle," color movie; "The Poisonous and Beautiful Cones," Roger Dunn; "A Cuban Shell Vacation," Dan Steger, shell slides in color; "Echoes of the Shell Show," a pictorial review by Dan Steger.

There were nine field trips. Shelling was good at all of the six different locations, and large groups attended.

The 17th Annual Shell Show was held March 25 through March 30 at the Treasure Island Auditorium. Judges were Dr. R. Tucker Abbott, Academy of Natural Sciences, Philadelphia; Dr. John Ferguson, marine biologist, Florida Presbyterian College; and Edgar Evans, professor of biology at St. Petersburg Junior College. Mrs. Patricia Torrance and Mrs. Mary D'Aiuto received the Smithsonian Award for their live exhibit, "Window into the Sea."

The annual picnic, which closed our season, was held at Fort DeSota Park on Mullet Key.

Officers elected for 1964-1965: President, Roger Dunn; Vice-President, Selma Lawson; Treasurer, William R. Reader; Recording Secretary, Dorothy Hanssler; Corresponding Secretary, Annabel Wetzel; Councillors-at-Large, Dr. Francis Smith and Robert Lipe.

CONCHOLOGICAL SECTION, BUFFALO SOCIETY OF NATURAL SCIENCES, Eunice A. Potter, Secretary: The once popular song hit, "I'm Little but I'm Loud," aptly describes the 1963 activities of our Section, now numbering twenty-four members. There was never a dull moment from the September reunion to the final meeting in June.

In October at the annual banquet occurred the long-anticipated submarine journey under the tutelage of U. B.'s biology teacher, Prof. John F. Storr. First he explained the difficulties of adjusting to underwater standing and crawling and operating a camera, and by means of his famous chalk drawings helped us understand his "Underwater Queeriosities."

Morley and Ethel Bishop gave us a full evening's program showing their down east shelling discoveries in Maine and the Maritimes. The three Bishop children are becoming true naturalists as they study tidepools and scour the rugged rocks for molluscan treasure.

Ellen Holdway took us on a map cruise around her native Britain listing the 750 known species found there and relating many of them to the economy of that "tight little island."

A completely new phase of shelling was presented us at our May meeting when Dr. Paul and Hilda Peters held us spellbound. While spending the month of November in Florida they devised a method of amassing a wealth of shells without demanding a large storage space. Of the 95,000 varieties of mollusks, seventy-five percent are less than one-half inch in length. At the low tide they dredge as far out in the Sanibel sands as they could, sifted the loose sand through strainers and stashed away the "debris" to carry home. All through the winter and spring they sorted, identified, measured, and labeled the delicate gastropods. Their "mīn'-ūt'es" were then meticulously mounted on metric graph paper and encased in uniform aluminum frames 4" by 1½" having double glass. In addition, Paul photographed the special varieties through a magnifier and projected these color slides on the screen.

Ethel Bishop and Eunice Potter have swapped American shells for those of Malaysia, New Zealand, Italy, and Belgium. In addition, Ethel became teacher and showed her collection to the Akron High School Biology Club and the local Golden Age Club. The secretary found herself answering queries to enthusiastic teen-agers asking how to start a science fair project. The most rewarding was an eighth grader, Maybelle Milikin, who competing

with tenth and eleventh graders won top award in her own city, Jesup, Georgia. Her display was then taken to the county and to the state where she placed fourth on her experiment, "Finding Calcium in Shells." She was urged by the judges to continue in this field.

Last, but not least, we report the success of our president's gigantic project, the making of a mussel bar. It is an exact replica of the one used on the Niagara River in 1963 when with Dr. J. P. E. Morrison he dragged the Niagara above Grand Island. Increased pollution of our lakes and streams has caused our club to be concerned with a mussel census. We are working in conjunction with the Smithsonian in this undertaking. Our officers continue from 1963: President, Eugene Musial; Vice-President, Mrs. Joseph Wandyez; Secretary, Mrs. A. Leslie Potter; Treasurer, Miss Louise W. Becker; Librarians, Mrs. Morley Bishop and Mrs. Alice Morrow.

PACIFIC NORTHWEST SHELL CLUB, Ann Smiley, Secretary: Officers for 1964 were Elsie Marshall, President; Lew Livingston, Vice-President; Ann Smiley, Corresponding Secretary; Barbara Kiely, Recording Secretary; Clarice Lynn, Treasurer. Meetings are held monthly, usually the third Sunday of each month, at various places in the Seattle-Tacoma area.

One field trip and picnic was held during July, at Deception Pass State Park north of Seattle. This is one of the excellent collecting places in our area, and it proved to be a very successful trip. Our annual picnic was at the Wheeler's home in Seattle, with a shell auction a feature of the afternoon, followed by a showing of Mrs. Wheeler's large collection of rare shells.

Many interesting programs were enjoyed by the members. One of the most outstanding was a talk by Dr. Alan J. Kohn on the Indian Ocean International Expedition in which he participated, after which we were shown the Jones collection of shells, now owned by the new Museum at the University of Washington.

CONNECTICUT VALLEY SHELL CLUB, Helen B. Burt, Secretary: Shell club meetings are held the second Monday of every month. We meet in the Lapidary Room of the Science Museum, 236 State Street, Springfield, Massachusetts, at 7:30 P.M., unless otherwise stipulated. Visitors are most welcome. Our membership has increased to 30. We entertained 52 visitors during the year and we were indeed proud to add four names to our honorary roster.

Some of the highlights of the club's fifth year included Sam Fuller's account of his freshwater shelling in the South; our combined picnic and freshwater collecting at Big Pond in Otis, Massachusetts; Earl Reed's (Curator at the Science Museum and a charter member) talk on "Dredging for Shells in the Gulf of Mexico"; a molluscan photography workshop in the home of Douglass Kennedy; our presentation of illustrated shell lectures and distribution of individual boxes of shells for the patients at the Shriners Crippled Children's Hospital; our annual Christmas party; Henry and Nellie Dow's illustrated lecture, "We Bring Hawaii to You"; Henry and Helen Burt's slides and talk on "Indian Summer Shelling on Martha's Vineyard and Southern Cape Cod"; the interesting presentation, "Ancestral Mollusks," by Mr. Percy A. Morris; Dr. Ruth D. Turner's talk about "Early New England Malacologists and New England Shelling Stations"; Austin and Ruth Warren's account of their "West Indian Shelling Adventure"; and our annual field trip to Cape Cod.

At every meeting we exhibited shells newly collected or acquired, and many

reports were given on the new collecting stations visited by our members. Some of our members have been busy giving illustrated shell lectures. Our president, Mrs. Henry B. Dow, and our secretary, Mrs. Henry E. Burt, Jr., appeared on Barbara Bernard's television show. While the Dows were in Hawaii they gave an illustrated talk, "Atlantic Coast Shelling," for the Hawaiian Malacological Society in Honolulu, Oahu. The Burts were privileged to present an illustrated talk, "From our Backyard to the Sea," for the Connecticut Shell Club in New Haven.

The officers elected for the 1964-1965 season are: President, Mrs. Henry B. Dow; Vice-President, Earl H. Reed; Secretary, Mrs. Henry E. Burt, Jr.; Treasurer, Mrs. Martha Menard.

If you are ever our way do come and see us.

NORTH CAROLINA SHELL CLUB, Hugh J. Porter, Secretary: In its eighth year, the North Carolina Shell Club now has about 225 junior and senior members. As the membership is statewide, the four scheduled meetings are held in different locations throughout the state. Winter inland meetings usually consist of a Saturday morning get-together and an afternoon formal meeting. Other meetings during the year are weekend coastal affairs consisting of several evening get-togethers, a formal meeting, and organized field trips. The 1964 schedule of meetings as set up by the Executive Committee and suggested by the club membership is as follows: March 13-15, Chesterfield Inn, Myrtle Beach, S. C.; May 22-24, Atlantic Beach Hotel, Atlantic Beach, N. C.; October 2-4, Wilmington College, Wilmington, N. C.; December 12, Highpoint College, Highpoint, N. C.

Since the last report to the AMU the following has occurred. In September, 1963 the club met at the courthouse building of Southport, N. C. Part of this meeting was devoted to a field trip to Bald Head Island. The December, 1963 meeting was in the State Museum of Natural History in Raleigh, N. C. At this meeting the following motion pictures were shown to the group: "Mollusca" and Walt Disney's "Mysteries of the Deep." A talk by the club secretary on "New Range Records of Marine Mollusca in North Carolina Waters" and a report by the club president on what he had collected from Gulf of Mexico dredged material bought from Mr. Jim Moore were also presented. The March, 1964 meeting, in Myrtle Beach, S. C., was a new experience for the club as it was the first time the club had met outside of North Carolina. During the meeting the club, hosted by members of the Grand Strand Shell Club of South Carolina, made field trips to nearby fossil beds and to Pawleys Island. The May, 1964 meeting in Atlantic Beach, N. C. featured the almost traditional chartered boat trip for collecting on Cape Lookout.

Dr. Ferguson of Chapel Hill, N. C. has continued giving his series of taxonomic workshops. During the year the club was presented a gavel and sounding board carved by club member Mr. W. R. McLean. Donated door prizes continue to be given and exhibits of members' collections usually are a part of each meeting. In December, 1963 the club made its first attempt at putting out an annual. It is hoped that this will be continued.

The 1964 officers are: President, Mr. Carl C. Withrow of Charlotte, N. C.; Vice-President, Dr. M. H. Bertling of Greensboro, N. C.; Secretary, Mr. Hugh J. Porter of Morehead City, N. C.; Treasurer, Mrs. Elizabeth T. Mathews of Wilmington, N. C. Members of the executive committee are Mr. Harry T. Davis of Raleigh, N. C. and Mr. James E. Wadsworth of Chapel Hill, N. C.

ROCHESTER SHELL AND SHORE CLUB, Marjorie Brenneman, Secretary: Rochester Shell and Shore Club held its first meeting at the home of Mrs. Berniece Plummer on October 17, 1963. Mrs. Plummer was responsible for our organizing and thus making us the youngest club affiliated with the American Malacological Union thus far.

Our first meeting was attended by eight people. Our last meeting for the month of June (will resume in September) was attended by 27 members.

Our club meets every fourth Wednesday of the month from 8:00 P.M. until 10:00 or 10:30 in the Nature Room of the Recreation Center, 740 University Avenue, Rochester, New York. It is open to all adults.

The aim of the Rochester Shell and Shore Club is—

“To bring together all persons interested in the beauty of shells and to encourage the study of conchology and of malacology; also to learn more about the habitat of mollusks and their relationship to other sea and shore life.”

Our emblem shell is *Viviparus contectoides*, W. G. Binney; we hope very soon to have stationery with this emblem in color on it.

We have been very fortunate in having programs of color slides, films, book reviews relating to shells used in art, a shell auction, scientific papers on the classes of mollusks, and a lecture by Dr. Wightman illustrated with color slides of shell collections in museums of the U.S.A.

During the summer months even though we have no official meetings, we did plan field trips. We had a trip in July looking for fossils. This was conducted under the able Mr. William Pinch, teacher from the Academy of Science of Rochester. Our second trip in August will take us to the ponds and lakes for freshwater mollusks.

We also became a member of the Audio-Visual Department of the Rochester Rundel Library and are privileged to borrow films on mollusks and other sea and shore animals.

It is with pride that we can say that we were able to set up a circulating library for our members as early as our third meeting. We think a good circulating library is the backbone of a shell club. As yet, we do not have too many good reference books but hope to obtain more as we expand. Enthusiasm is high among new members to learn about shells and the mollusks inhabiting them and it is essential that they obtain good books to help them in this respect and not have to wait too long before a book is available. We are so encouraged though by our rapid growth that we feel confident our library will grow along with our club. As a further help to our members, our librarian prepared and distributed to each member a list of shell books that are available at the Rochester libraries.

The first fifteen minutes of our meetings are devoted to business. This is followed by an observation period in which each member participates. It is like a Show and Tell period as each person is allowed two minutes in which to show and tell about a shell, a shell book, or perhaps an article that appeared in a newspaper or magazine that pertained to sea or shore life. This encourages everyone to take an active part in the meetings. We then have our committee reports.

With pride we can say that although we have had only seven meetings to date, we already have a committee chairman for membership, telephone and Audio-Visual, and a librarian, an historian, and a field trip leader.

If we are lucky enough to have some shells sent to us, they are given out

following the committee reports. At this point we allow ten minutes to explain glossary terms and to give help in classifying. The president then asks for a question that we can all do research on and bring the answer to the next meeting. This ends the formal part of our meeting. We now have time for a program of about an hour.

Our officers for May 1964-1965 are as follows:

President, Mrs. Berniece Plummer; Vice-President, Mrs. Wilfred Stiffler; Secretary, Mrs. Marjorie Brenneman; Treasurer, Mrs. Betty Little.

GARDEN STATE (NEW JERSEY) SHELL CLUB, Jane Zager, President: Our club was organized April 26, 1963 by a group of fourteen enthusiastic shell collectors. Three officers were elected: a President, a Vice-President, and a Secretary-Treasurer. These three were also to act as the Executive Committee.

A basic charter was adopted, using Robert's Rules of Order as the governing regulations of procedure.

Meetings were held in members' homes until November, 1963, when we acquired meeting room at The Irvington State Bank, 918 Springfield Avenue, Irvington, New Jersey.

We consider the basic objectives of our club to be:

(1) Study of Mollusca:

Members' interest and degrees of accomplishment are varied, but with the common desire to learn.

Great interest has been shown in the "Shell Clinic" portion of our meetings, when we bring reference books and our controversial specimens to help each other pin down proper identifications.

We aim at a fine club library. More than forty books and bulletins have been donated to us.

Occasionally we will have trays of donated shells which are sold at meetings, the proceeds appropriated to club institutions such as the library. Through the years we shall accumulate the very best in reference material.

(2) Promotion of interest in conchology:

Plans are being made for a special study program for juniors—our conchologists of tomorrow!

(3) The preservation of New Jersey Mollusca:

We are working on a club collection of the marine, land, freshwater, and fossil shells of our state. We hope, in time, to present collections of New Jersey mollusks to city and state museums, and to help scientific and educational groups.

(4) Development of good fellowship:

We have field trips during the summer months; one each for land and freshwater, marine, and fossil collecting. After each meeting a "coffee break" affords time for getting better acquainted and exchanging ideas.

We realize that our organization is neither the first nor the last of its kind. We had felt for some time that there was a need to bring together people who share this great hobby. New Jersey has had no organized group devoted to malacology and we felt there was enough interest to almost necessitate organizing our club. We now feel we can open our doors to new members with any interest in shells. Visitors are always cordially welcome.

For further information contact Mrs. Joseph (Jane) Zager, 326 Union Avenue, Irvington, New Jersey 07111, phone 374-7960 (Area Code 201).

GULF COAST SHELL CLUB, Anna Mae Bishop, President: The increased popularity of shell collecting is reflected in the growth of our club from its original 15 members to its present 45, as our club slides smoothly into its fourth year of activities.

Last October our club placed an exhibit of shells in the South Texas State Fair and received a Special Award for its collective efforts.

In March, under the capable leadership of Mrs. Harry Kingston, the club successfully sponsored its Second Annual Shell Show. The Shell-of-the-Show was won by Mrs. Mildred Tate of Lake Jackson for her very rare *Pleurotomella edgareana* Dall that was dredged in very deep water in the Gulf of Mexico. The Academy of Natural Sciences Award went to Junior Member Harry Lea Kingston, and Mrs. J. Brooks Bishop, Jr., was the recipient of the Gulf Coast Shell Club Award. Mr. and Mrs. James Donovan of West Palm Beach, Florida served as our able judges. The club is now working out plans for our Third Annual Shell Show which will be held in April.

Last April the club elected the following new officers: Mrs. J. Brooks Bishop, Jr., President; Mrs. Joe W. Hart, Vice-President; Mrs. Ike Broussard, Secretary; William G. Cupit, Treasurer; and Joe Kerr Varnado, Historian. The new officers drafted a new set of bylaws which were adopted by the club.

A library has been started for the benefit of the club members and we hope to see many shell books added in the months to come.

We are at present in the midst of contributing specimens and data to interested museums. Since our city has no museum, we are assembling a collection of Texas and foreign shells for permanent display in the Tyrrell Public Library. We hope eventually to have as nearly complete a collection of Mollusca of this area as possible.

Our monthly paper, "Between the Tides," which is in its second year of publication, has been instrumental in our membership growth. The monthly issue entails an enormous volume of work done by the Editorial Staff: Mrs. Howard Varnado, Mrs. Bishop, Mrs. Mildred Tate, and Mrs. S. L. Curtis.

A recent feature of our publication is the Mitchell's Wentletrap Register, patterned after Hawaii's Golden Cowrie Register. We invite everyone who owns an *Amaea mitchelli* Dall, which is "uncommonly washed ashore in Texas," to send us the measurements in millimeters. The length and width (taken at the widest point) are multiplied together to get the register number. We hope soon to hear from many nonmember *mitchelli* owners including the museums. Since so little is known of this uncommon shell, we hope that by compiling a list of this sort, it will be of some scientific help.

The club is ready to add a "Shell-of-the-Month" feature to our publication, which will be a monograph of a Texas shell and its allied family.

Some of our members are becoming interested in the mollusk as well as the shell, and salt-water aquariums are being established to help us keep our little pets alive for study.

Other plans for the coming year include displaying shells in the local schools, a shell poetry contest, our first shell auction, some winter field trips, and to make our Christmas party an annual event.

Yes, even bigger and better things are to come in our future, including a

more or less permanent project for the club so that all of our members will have an equal opportunity to participate in the activities of the organization.

We cordially extend an invitation to shell collectors, their families and friends, to visit our meetings which are held the second Tuesday of each month at the First Federal Savings and Loan Bldg., 4290 Highland Ave.

SAN ANTONIO SHELL CLUB, Myra Taylor, President: Members of this land-locked club have an interesting and varied program of activities each year. Field trips were taken to nearby rivers for freshwater mollusks; to gravel pits, cliffs, riverbanks, roadcuts and quarries for fossils; and to the Texas Gulf Coast for marine shells; as well as excursions to search for land forms.

Our programs have included films and accounts of collecting experiences by our members, and one extra-special evening of outstanding and beautifully photographed films of marine life, photographed and narrated by Dr. John E. Prince, Chief of the Cellular Biology Section of the Aerospace Medical Center in San Antonio.

Our club participates in the annual Hobby Festival at Fort Sam Houston each year, and again this year won a blue ribbon for our efforts. We also planned and executed a twelve-case exhibit of Texas mollusks for the Witte Museum. This exhibit is now one year old, and is still in place. On request, an exhibit was placed at the Service Club #1 at Fort Sam Houston for two months. Members of our club entered a large exhibit, including a salt-water aquarium containing live mollusks, in the annual Home and Hobby Show. Thousands of people saw this exhibit, and we acquired several new members from the attendant publicity. A quarterly publication, "The Texas Shell News," is now in its seventh year, with copies to regular members and to our many corresponding members.

Visitors are always welcome. We meet on the fourth Monday of each month at 8:00 P.M. in the Educational Building of the Asbury Methodist Church, 4601 San Pedro Ave., San Antonio. Officers are: President, Mrs. Jud Taylor, 1629 W. Magnolia; Vice-President, Renford Taylor, 510 Ridgewood; Secretary, Mrs. Ed Halbardier, 121 Aylesbury Hill; Treasurer, Mrs. John Bayne, 219 Rosemary; and Editor-in-Chief, Mrs. Laura Gilbert, 451 Hammond. All officers live in San Antonio.

JACKSONVILLE SHELL CLUB, INC., Mrs. Frank J. Macedonia, Corresponding Secretary: The autumn months of 1963 were filled with plans for incorporating, becoming affiliated with the Children's Museum, and our third annual shell show. Programs for 1964: January: three short color films, "The Voyage of the Explorer," "The U. S. Coast and Geodetic Survey," and "Skin and Scuba Diving in Florida"; February: talks by members, "The Cenozoic Era in Eastern North America," "Fossil Hunting at Williamsburg, Virginia and Lake Okeechobee, Florida," and a demonstration of a new technique for cleaning fossil shells, by a member; March: Mr. Ralph S. Hager, Chief of Information and Education of the Florida Board of Parks and Historic Memorials, Tallahassee, reported to us on "The Conservation of Natural Resources of Florida" and showed the John Pennekamp Coral Reef State Park film; April: an illustrated talk by Dr. Josef Vagvolgyi, Department of Biological Sciences, University of Florida, on "The Evolution of Mollusks"; May: a Question and Answer Program, with four members on the panel, preceded by

a short talk by Mrs. W. A. Fisackerly, Principal of Jessie Ball DuPont Orthopedic School, also a member. The June meeting was devoted to the upcoming shell show.

"Shells of the World" (chairman, Mr. Edward Hoegg Thompson), was held at the Florida State Chamber of Commerce Building on July 17, 18, and 19. Judges were Drs. William J. Clench, R. Tucker Abbott, and William H. Heard. Forty-three persons entered sixty-five exhibits in sixteen categories and the winners were residents of five Florida cities from here to South Miami, and Massachusetts and Texas. Special features of the show included a talk by Dr. Abbott, the Academy of Natural Sciences Award winning exhibit, the Shell-of-the-Show, and the famed *Conus gloria-maris* that was pictured in *Life* magazine, July 10 issue. A printed 16-page souvenir program booklet was given to over 2,000 visitors.

Other activities: January through April: Discussion groups were held Wednesday nights at the Museum. Aids used were drawings, charts, slides, films, and four especially prepared book lists; March 4, public address by Dr. Clench on ecology; April 19, field trip to Cedar Key, Florida.

Another field trip and four interesting programs are planned for the balance of the year. Meetings are open to the public, held the fourth Thursday of each month (except December), 8 P.M. at the Arlington Federal Savings and Loan Association, 930 University Boulevard. Programs are presented first, business follows a short coffee break with refreshments.

Other officers are: Mrs. A. W. Raven, Jr., President; Mr. H. Mace Stephens, 1st Vice-President and Program Chairman; Mr. Robert A. Melton, 2nd Vice-President; Mrs. Marguerite Wheldon, Recording Secretary; Mr. Paul W. Schoen, Treasurer; and Mrs. Edwin S. Hicks, Editor, "Shell-O-Gram," club publication. Appointed officers: Mrs. Howard VanBuskirk, Counselor; Miss Celia M. Gregg, Membership; Mrs. H. Mace Stephens, Hospitality and Librarian; and Mrs. Gertrude Moller, Historian and Publicity.

CONCHOLOGICAL CLUB OF SOUTHERN CALIFORNIA, Roy Poorman, President: Our meetings are held the first Monday of each month throughout the year at the Los Angeles County Museum in Exposition Park. The officers for the current year are: Roy Poorman, President; Frances Cramer, Vice-President; Erva L. Barber, Secretary; James Starr, Treasurer.

At the AMU convention in New Orleans we had a rather extensive display showing some of the contributions to conchological literature made by various members of our club. At present two large projects are under way among our members.

Helen DuShane, with the assistance of Jean Cate, is preparing a list of new species from the Panamic area which have been described in the literature since the appearance of Myra Keen's *Shells of Tropical West America* in 1958.

The entire club is presently engaged in preparing distribution lists of various species along the coast of California and in the Gulf of Mexico. It is expected that this project will take quite a little time to complete. Helen DuShane is chairman of the Gulf of California group while Bob Howley has charge of those from the coast of California.

On September 20, 1964, under joint auspices of the Illinois Council of Skin and SCUBA Divers and the Chicago Natural History Museum, the organizational meeting of the Chicago Shell Club was held. Eager response to the call to organize augurs well for the future of this newest club. Word has been received that the leading order of business at the second meeting was affiliation with the AMU.

* * *

Other local shell clubs affiliated with the American Malacological Union are the Greater St. Louis Shell Club, Naples (Florida) Shell Club, Pacific Shell Club (Los Angeles), Sacramento Valley (California) Conchological Society, the San Diego (California) Shell Club, and The Shell Club of the Ryukyu Islands (Okinawa).

* * *

IN MEMORIAM

Richard W. Foster
Caleb Hollingsworth
Mrs. Charles S. Lewis
Mrs. Willard Mohorter
William A. Smith
Jay Weber
Dr. Julius Wisoff

ACTIVE MEMBERS

Membership List Revised November 30, 1964

* Pacific Division member

- Abbott, Dr. R. Tucker, Dept. of Mollusks, The Academy of Natural Sciences of Philadelphia, 19th and The Parkway, Philadelphia, Penn. 19103.
- * Abel, Richard and Co., P.O. Box 5357, Portland, Ore. 97206.
- Adams, Lawson, 2100 S. Bay St., Milwaukee, Wisc. 53207. (Amateur.)
- Aguayo, Dr. Carlos G., College of Agriculture, Mayaguez, Puerto Rico 00708.
- * Albert, Mrs. Ernest, U. S. Army Eng., G.P., Bldg. & Grnds., APO 331, San Francisco, Calif. 94101.
- * Alexander, Mrs. Robt., 8542 Lemon Ave., La Mesa, Calif. 92041.
- Alexander, Robt. C., 423 Warwick Rd., Wynnewood, Penn. 19096.
- Allen, Dr. J. Frances, 5702 Queen's Chapel Rd., West Hyattsville, Md. 20782.
- Allen, Lester E., 187 Argyle St., Yarmouth, Nova Scotia, Canada.
- Allen, Miss Letha S., 107 W. 29th St., Baltimore, Md. 21218. (Mollusks in general.)
- * Allison, Dr. Edwin C., 531 Bonaire Pl., La Jolla, Calif. 92307. (Fossil, Recent, and mega-micro marine invertebrates.)
- Allwell, Mrs. Stephen S., 803 Evesham Ave., Baltimore, Md. 21212. (Rapididae, Magilidae, Coralliophilidae.)
- Alspaca, Mr. and Mrs. Chas., 110 N. Highland Pl., Croton-on-Hudson, N. Y. 10520.
- American Association for the Advancement of Science, 1515 Massachusetts Ave., Washington, D. C. 20505.
- Anderson, Mr. and Mrs. Albert L., 2416 W. Fargo Ave., Chicago, Ill. 60645. (Scuba diving.)
- Anderson, Miss Katherine M., Box 206, Chillicothe, Ohio 45601. (*Pecten*, *Murex*.)
- Armstrong, Mrs. Eliot, 14 Meadowview Pl., Buffalo, N. Y. 14214.
- * Arnold, Ben E., Rt. 5, Box 27, Port Orchard, Wash. 98366. (Tropical and semi-tropical marines.)
- Ashbery, Mrs. Wallace H., 12 E. Depew Ave., Buffalo, N. Y. 14214.
- Ashworth, Ann S. and James H., 9265 N. W. 32 Ct. Rd., Miami, Fla. 33147. (Live mollusks.)
- Aslakson, Capt. and Mrs. C., 5707 Wilson Lane, Bethesda, Md. 20034. (World marine shells.)
- Athearn, Herbert D., Rt. 5, Box 376, Cleveland, Tenn. 37311. (Freshwater mollusks.)
- Athearn, Mrs. Roy C., 5105 N. Main St., Fall River, Mass. 02720. (Land shells.)
- Atwater, Rev. David T., 50 Grace Court, Brooklyn, N. Y. 11201.
- Awald, Clifford J., 162 Southwood Dr., Kenmore, N. Y. 14217. (Mineral collector.)
- ** Baily, Dr. and Mrs. Joshua L., Jr., 4435 Ampudia St., San Diego, Calif. 92103.
- * Baker, E. P., 11619 Downey Ave., Downey, Calif. 90241. (Pacific Coast shells; exch.)
- Baker, Emmett B., 7 Riverview Ave., Kingston, Mass. 02364. (General interest.)
- Baker, Dr. and Mrs. Horace B., 11 Chelten Rd., Havertown, Penn. 19083.
- Baker, John A., P.O. Box 171, Biscayne Annex, Miami, Fla. 33152. (General interest.)
- * Baker, Nelson W., 279 Sherwood Dr., Santa Barbara, Calif. 93105. (General interest.)
- Baker, Wm. R., 207 S. 6th St., Ferriday, La. 71334.
- Barbosa, Frederico Simoes, Caixa Postal 1626, Recife, Pernambuco, Brazil. (Fresh-water shells.)
- Bayer, Frederick M., Marine Lab., Univ. of Fla., 1 Rickenbacker Causeway, Miami, Fla. 33149.
- Beaumont, J. V., 904 Orange St., Apt. B, New Orleans, La. 70130.
- Beaven, Dr. and Mrs. J. Mahlon, 175 W. Ridgewood Ave., Ridgewood, N. J. 07450. (Amateurs; beautiful shells.)
- Becker, Mr. and Mrs. Albert F., 2157 Sunrise Dr., La Crosse, Wisc. 54602. (Mississippi River shells.)
- Becker, Miss Louise W., 2 Lexington Ave., Buffalo, N. Y. 14222.

- Bedell, Adele Koto, 2643 Laundale Dr., Beloit, Wisc. 53511.
- *Bedford, Charles A., Gen. Del., Roberts Creek, British Columbia, Canada.
- Beetle, Mrs. Dorothy, Charlotte Children's Nature Museum, 1658 Sterling Rd., Charlotte, N. C. 28209. (Land and freshwater world shells.)
- *Behrens, Grace, 2130 Dela Vina St., Apt. 5, Santa Barbara, Calif. 93105. (Abalone and starfish.)
- *Bell, Jas. H., Box 1262, U. S. Naval Postgraduate School, Monterey, Calif. 93940.
- *Bequaert, Dr. Joseph C., Dept. of Entomology, Univ. of Ariz., Tucson, Ariz. 85717.
- Berg, Mrs. Frederick C., Georgetown, Md. 21930. (Shells of the Florida Keys.)
- Bergeron, Eugene, P.O. Box 1236, Balboa, Canal Zone. (Biological survey of Panamic range fauna Mollusca.)
- Berry, Dr. and Mrs. Elmer G., Natl. Institutes of Health, Bethesda, Md. 20014.
- *Berry, Dr. S. Stillman, 1145 W. Highland Ave., Redlands, Calif. 92373.
- Bijur, Jerome M., 215 S. Fairfield Rd., Devon, Penn. 19333. (Florida shells.)
- Bippus, Alvin C., 2743 Sagamore Rd., Toledo, Ohio 43606. (Marine gastropods.)
- Bixby, Mrs. H. M., Look See, Captiva, Fla. 33924. Summer: Bolton Landing, N. Y. 12814.
- Blaine, Mr. and Mrs. Alger P., 74 Palmer Ave., Springfield, Mass. 01108. Winter: 237 19th Ave., S. St. Petersburg, Fla. 33706.
- Blinn, Walter C., Dept. Nat. Sci., Mich. State Univ., East Lansing, Mich. 48901. (Ecology and behavior of land snails.)
- *Boneff, Mr. and Mrs. R. J., 2217 S. E. Madison, Portland, Ore. 97214. (Indo-Pacific specimen shells.)
- Boston Malacological Club, Mollusk Dept., Museum Comparative Zoology, Cambridge, Mass. 02138.
- Bradfield, Mrs. Jesse, Mt. Alto, Rome, Ga. 30163. (General interest.)
- Bradley, J. Chester, 604 Highland Rd., Ithaca, N. Y. 14850.
- Bradley, John C., 469 Farmington Ave., Waterbury, Conn. 14850. (Travel and collect.)
- Branson, Branley A., Dept. Biol., Kansas State College of Pittsburg, Pittsburg, Kans. 66764. (S. W. gastropods and fishes.)
- *Bratcher, Twila L., 8121 Mulholland Terr., Hollywood, Calif. 90046
- Brimmer, Allen, 9805 Parkwood Dr., Bethesda, Md. 20014. (*Harpa*, *Spondylus*, *Dentalium*, cephalopods.)
- Broadus, Jas. M. III, 449 W. 3rd St., Lexington, Ky. 40508. (Gulf of Mexico species.)
- Brooks, Mr. and Mrs. John C., 711 S. Indian River Dr., Ft. Pierce, Fla. 33450. (Florida marine mollusks.)
- Broward Shell Club, c/o Mrs. Jean Redding, 517 S. W. 9th St., Ft. Lauderdale, Fla. 33315.
- *Brown, Dorothy, 1415 N. Ogden Dr., Los Angeles, Calif. 90046.
- Brown, Mrs. Ward, 1420 N. Lakeside Dr., Lake Worth, Fla. 33460.
- Broyles, Mrs. Ralph E., 5701 Fairfield Ave., Ft. Wayne, Ind. 46807.
- *Brugman, Chas., Box 468, Lahaina, Hawaii 96761. (Shells and black coral of Hawaii.)
- *Brunson, Dr. Royal Bruce, Mont. State Univ., Missoula, Mont. 59801.
- *Bryon, Edwin H., Jr., Bishop Museum, Honolulu, Hawaii 96817. (Pacific biogeography and bibliography.)
- Bullis, Harvey R., Jr., 101 Hague St., Pascagoula, Miss. 39567. (Western Atlantic, Caribbean, and Gulf of Mexico gastropods.)
- Burch, Dr. John B., Museum of Zool., Univ. of Mich., Ann Arbor, Mich. 48104. (Land and freshwater mollusks.)
- *Burch, Mr. and Mrs. John Q., 4206 Halldale Ave., Los Angeles, Calif. 90062.
- Burch, Dr. and Mrs. Thomas, 49 "D" St., S. E., Washington, D. C. 10003. (Dredging.)
- Burchell, Herbert R., 991 S. W. 13th St., Boca Raton, Fla. 33432.
- Burgers, Dr. and Mrs. J. M., 4622 Knox Rd., Apt. 7, College Park, Md. 20740.
- Burke, Alice A. and Thos. D., Jr., 1820 S. Austin Blvd., Cicero, Ill. 60650. (Marine mollusks of eastern U. S. A.)

- *Campbell, Dr. Bruce, 11221 Elm St., Lynwood, Calif. 90263.
 Cardeza, Carlos M., 3829 Gertin St., Houston, Texas 77004. (Amateur.)
 Carley, T. S., 407 Kingston, Deerfield, Ill. 60015. (General interest.)
 Carrier, Dr. M. R., Marine Biological Lab., Woods Hole, Mass. 02543. (Shell demineralization; boring mechanisms of mollusks; marine ecology.)
 Cartwright, Mr. and Mrs. Jas. B., 4533 Park Ave., Memphis, Tenn. 38117. (Atlantic and Gulf Coast shells.)
- **Cate, Mr. and Mrs. Crawford N., 12719 San Vicente Blvd., Los Angeles, Calif. 90049. (*Mitra*, *Cypraea*.)
- **Chace, Mr. and Mrs. Emery P., 3446 Van Dyke Ave., San Diego, Calif. 92105.
 Chamberlain, Dr. J. Lockwood, 509 Franklin St., Alexandria, Va.
 Chandler, Carl and Doris, P.O. Box 621, Rt. 28, Chatham, Mass. 02633. (*Conus*, *Cypraea*.)
 Chatham Marine Shell Museum, Carl and Doris Chandler, Directors, P.O. Box 621, Rt. 28, Chatham, Mass. 02633.
- *Cheever, Dr. Austin W., 1330 St. Louis Dr., Honolulu, Hawaii 96816.
 Chicago Shell Club, Chicago Natural History Museum, Chicago, Ill. 60605.
 Clarke, Dr. Arthur H., Jr., Dept. of Mollusks, Natl. Museum of Canada, Ottawa, Ontario, Canada.
- Clarke, Dr. Rosemary, 2049 University Ave., Dubuque, Iowa 52002.
 Clench, Dr. Wm. J., Museum Comparative Zool., Cambridge, Mass. 02138.
 Cleveland Museum of Nat. Hist., 10600 E. Blvd., Cleveland, Ohio 44106.
 Cloidt, Chas. J., 74 Manhattan Ave., Avenel, N. J. 07001. (Shells of New Guinea and the Philippines.)
- *Coan, Eugene, 891 San Jude Ave., Palo Alto, Calif. 94306.
 Coastal Bend Shell Club, c/o Corpus Christi Museum, 1202 N. Water St., Corpus Christi, Texas 78401.
- *Coats, Miss Ruth E., 3846 Skyline Dr., Carlsbad, Calif. 92008.
 Cole, Wm. H., 119 Livingston Ave., New Brunswick, N. J. 08902. (Florida west coast shells.)
- Coley, Mrs. Gene, 2221 Bayview Rd., Punta Gorda, Fla. 33950.
 Compitello, Mrs. Juliette, 399 St. John's Place, Brooklyn, N. Y. 11238.
- *Conchological Club of Southern Calif., Los Angeles County Museum, 900 Exposition Blvd., Los Angeles, Calif. 90007.
 Conch. Section, Buffalo Society Nat. Sci., c/o Mrs. A. L. Potter, 6350 Main St., Williamsville, N. Y. 14221.
- Condé, Vincente, Redpath Museum, McGill Univ., Montreal, Canada.
 Conkling, Joseph E., Box 264, Edgartown, Mass. 02539. Winter: Leders San Rick Lodge, Marathon Shores, Fla. 33052. (Collect; buy; exch.)
- Connecticut Shell Club, Peabody Museum, New Haven, Conn. 06501.
 Connecticut Valley Shell Club, Springfield Museum of Nat. Hist., 236 State St., Springfield, Mass. 01103.
- Conrath, Jas. P., 127 Indiana St., Rapid City, S. D. 57705. (Shell photography.)
 Coomans, Dr. H. E., Am. Museum Nat. Hist., Central Park W. at 79th St., New York, N. Y. 10024.
- Cooper, Robt. W. and Marjorie, 5012 Pfeiffer Rd., Peoria, Ill. 61607. (Florida marine shells; world *Murex*, *Pecten*, *Spondylus*.)
- Corbett, Wm. Phelps, 2939 Nelson St., Ft. Myers, Fla. 33901. (Exch. rare *Cypraea*, *Olivia*, *Murex*.)
- Corgan, Jas. X., Box 521, Tulsa, Okla. 74101. (Microscopic gastropods.)
 Cornell University Library, Research Dept., Ithaca, N. Y. 14850.
 Cowles, Edw. F., Jr., 12 Hillcrest Ave., New Rochelle, N. Y. 10801. (Photography; tropical marine shells.)
- *Cox, Keith W., 309 Hillside Dr., Woodside, Calif. 94061.
 Craig, Mrs. G. E. G. Gwynne-, San Carlos Trailer Court, Apdo. 88, Guaymas, Sonora, Mexico. (Shells of Panamic Province.)
 Craine, Ruth A., 82 S. Broad St., Norwich, N. Y. 13815.

- *Cramer, Frances L., Life Sci. Dept., 967½ W. 30th St., Los Angeles, Calif. 90007.
 Crocker, Mr. and Mrs. Arthur M., Laurel Hollow, Syosset, N. Y. 11791.
 Crum, Mrs. Dan, 930 N. E. 23rd St., Crest Haven, Pompano Beach, Fla. 33064. (*Conus*, *Voluta*.)
 Cull, Mrs. R. R., 7927 Chippewa Rd., Brecksville, Ohio 44141.
 Cummings, Raymond W., 121 Rugby Rd., Syracuse, N. Y. 13206. (Shells of West Indies, esp. Windward and Grenadine Is.)
- Daigle, Mr. and Mrs. A. J., 219 Lana Dr., Lafayette, La. (*Murex*.)
 D'Amico, Jos. S., 119 Persimmon Lane, Lake Jackson, Texas 77566.
 D'Attilio, Mr. and Mrs. Anthony, 44 Lynwood Dr., Valley Stream, L. I., N. Y. 11580.
 Davis, Dr. Geo., University Museum, Univ. of Mich., Ann Arbor, Mich. 48104.
 Dawley, Dr. Charlotte, The Woman's College, Univ. of N. C., Greensboro, N. C. 27412.
 Deatrick, Paul A., P.O. Box 35-366, Miami, Fla. 33101. (*Strombus*, *Busycon*.)
 DeLuca, Miss Gladys and Mrs. John A., 16 Oakland Ave., Wollaston, Mass. 02170.
 DeRoy, Jacqueline, Isla Santa Cruz, Galápagos, Ecuador.
 Desmond, Hon. Thos., 94 Broadway, Newburgh, N. Y. 12553.
 Dexter, Dr. Ralph W., Dept. Biol., Box 507, Kent State Univ., Kent, Ohio 44240.
 Deitrich, Mr. and Mrs. Louis E., 301 Veri Ave., Pittsburgh, Penn. 15220. (Shells of the West Indies.)
 Dodd, Wm. E., M.D., Ocean St. and Bay Ave., Beach Haven, N. J. 08008.
 Dodge, Henry, 443 Park Ave. S., New York, N. Y. 10016.
 Dodge, Mary W., Upper Station Rd., Garrison, N. Y. 10524. (East coast and Florida shells.)
 Donovan, Jas. W., 3718 Calvin Ave., West Palm Beach, Fla. 33407.
 Duarte, Eliseo, Casilla Correro 1401, Central, Montevideo, Uruguay. (Exch. shells and information.)
 Dundee, Dr. Dolores S., Dept. Biol., La. State Univ. in New Orleans, New Orleans, La. 70150. (Land mollusks; freshwater mussels.)
 Dunn, V. Roger, 5021 18th Ave., S., Gulfport, Fla. 33707. (*Conus*.)
 *DuShane, Mrs. Jos., 15012 El Soneto Dr., Whittier, Calif. 90603.
 Dvorak, Stanley J., 3856 W. 26th St., Chicago, Ill. 60623. (Muricidae.)
- Eckhardt, Mary Jean, 35 Prospect Park W., Brooklyn, N. Y. 11215.
 Eddison, Grace G., M.D., 4740 Iselin Ave., Riverdale, N. Y. 10471. (World marine shells.)
 Edmiston, Mrs. J. R., 221 N. La Salle St., Suite 963, Chicago, Ill. 60601.
 Eken, Elizabeth B., M.D., 83 Maple Ave., Morristown, N. J. 07960. (Cones.)
 *Ellis, Dr. Derek V., Dept. Biol., Victoria Univ., Victoria, B. C., Canada.
 Emerson, Dr. William K., Museum of Nat. Hist., Central Park W. at 79th St., New York, N. Y. 10024.
 Emery, Adele K., Box 1265, South Miami, Fla. 33143. (Florida east coast shells.)
 Enders, Mr. and Mrs. Ernest M., 3 Ellen Dr., Farmington, Conn. 06032. (Amateurs.)
 Endres, Theo. F., 663 Pleasant St., Algonac, Mich. 48001. (Amateur.)
 Erickson, Carl W., 4 Windsor Ave., Auburn, Mass.
 Eubanks, Mrs. Edwin W., 3524 Tanglebriar Dr., Pasadena, Texas 77503. (Florida marine shells.)
 *Eyerdam, Walter J., 7531 19th Ave., N. E., Seattle, Wash. 98115.
- *Falconer, Miss Bessie, 24634 Lawton Ave., Loma Linda, Calif. 92354.
 *Fancher, Madeline J., Box 144, Bridge Rt., Myrtle Point, Ore. 97458. (Amateur.)
 Farrell, Lyle H., Proctor Academy, Andover, N. H. 03216.
 Faulkinbury, R. P., 106 Pensacola Ave., Fairhope, Ala. 36532. (Small shells of north-west Florida and Alabama.)
 Feinberg, Harold, 2334 Tietbout Ave., Bronx, N. Y. 10458. (Land and freshwater shells.)

- Ferguson, Robt. A., 615 Liberator Dr., K. I. Sawyer AFB, Mich. 49843.
- Finlay, C. John, 16 N. Woodward Ave., Roselle, Wilmington, Del. 19805. (West Indian marine shells.)
- *Fitch, John E., State Fisheries Lab., Terminal Is., San Pedro, Calif. 90731.
- Fitzgerald, Mrs. A. C., 11 Joy St., Boston, Mass. 02114. (Marine borers.)
- *Fletcher, Mr. and Mrs. Howard L., 1008 La Hermosa Dr., Redlands, Calif. 92373.
- Flipse, Robt. C., M.D., and Mrs. Flipse, 1091 N. E. 88th St., Miami, Fla. 33138.
- Foehrenbach, Jack, 91 Elm St., Islip, L. I., N. Y. 11751. (Ecology of marine mollusks.)
- Foley, H. Thos., 921 Ontario St., Shreveport, La. 71106. (Intense amateur!)
- Ford, Mr. and Mrs. Flynn, 1533 Topping Rd., St. Louis, Mo. 63131.
- Forrest, Mrs. Wilbur, The Birches, New Hope, Penn. 18938.
- *Forthun, Miss Effie, 507 Harvard E., Apt. 203, Seattle, Wash. 98102.
- Foster, Mrs. Fred H., Oxford, Ind. 47971. (Shells in general.)
- Frampton, Mr. and Mrs. Henry G., Box 1052, Miami, Fla. 33106.
- *Franchini, Irene, P.O. Box 41, Tranquillity, Calif. 93668.
- Franzen, Dr. Dorothea, Ill. Wesleyan Univ., Bloomington, Ill. 61702.
- Freeman, Mr. and Mrs. Harley L., 353 S. Atlantic Ave., Ormond Beach, Fla. 32074. (West Atlantic shells.)
- *French, Mr. and Mrs. Mead, P.O. Box 1148, San Pedro, Calif. 90733.
- Frischmuth, R. W., 35 Lyman Circle, Shaker Heights, Ohio 44122. (Pectinidae.)
- Fusto, Thos. R., 775 Roosevelt St., Franklin Sq., N. Y. 11010.
- Gaffert, Mrs. Ester A., 1224 Cherry St., Winnetka, Ill. 60093. ("Rank amateur!")
- Garden State Shell Club, c/o Jane Zager, 326 Union Ave., Irvington, N. J. 07111.
- Gause, Wanda Van Brunt, 3801 Alhambra Circle, Coral Gables, Fla. 33134. (Florida shells.)
- Geological Survey of Canada Library, Room 350, 601 Booth St., Ottawa, Ontario, Canada.
- Ghiselin, Michael, Museum Comp. Zool., Cambridge, Mass. 02138.
- Gilbert, Mrs. Laura, 451 Hammond Ave., San Antonio, Texas 78210. (All shells.)
- Gillam, Elizabeth H., 7 Clifton Ave., Merchantville, N. J. 08109. (Amateur.)
- *Glude, John B., 3231 8th, W., Seattle, Wash. 98199. (Biological investigation of *Mya* and *Venus*.)
- Good, Mrs. Barbara J., 3142 Larga Court, San Diego, Calif. 92110.
- Gordon, Henry S., 1 Washington Sq. Village, 4F W., New York, N. Y. 10012.
- Gordon, Mackenzie, Jr., c/o American Consulate PA, APO 676, New York, N. Y. 09676. (West American Mollusca.)
- Goss, Richard, 5 Chamberlin Drive, Marathon, Fla.
- Graaf, Gerrit de, 10915 S. W. 55th St., Miami, Fla. 33165.
- Grabie, Mrs. A. J., 286 Grand Central Ave., Amityville, L. I., N. Y. 11701.
- Graf, Jas. R., 3117 Grindon Ave., Baltimore, Md. 21214. (World shells.)
- *Grant, Dr. U. S. IV, 121 Groverton Pl., Los Angeles, Calif. 90024.
- Grantier, Mrs. Bruce J., 90 Northdale Rd., Willowdale, Ontario, Canada.
- Graves, Howard B., Jr., 826 S. Ingraham, Lakeland, Fla. 33801. (*Conus*.)
- Greater St. Louis Shell Club, c/o Mrs. Chas. Novak, 3456 Keokuk St., St. Louis, Mo. 63118.
- Greathouse, Mrs. W. J., 300 Vaden Rd., Poplar Bluff, Mo. 63901. (Panama shells.)
- Greenberg, Isidore, 1245 Eastern Pkwy., Brooklyn, N. Y. 11213. (Photograph and collect shells.)
- *Greene, Karl W., Box 3751, Honolulu, Hawaii 96811. (*Conus*.)
- *Gregg, Wendell O., M.D., 2220 S. Harvard Blvd., Los Angeles, Calif. 90018.
- *Griffith, Mrs. Lela M., Egmont, British Columbia, Canada. (British Columbia marine shells, also *Conus* and *Cypraea*.)
- Grimm, F. Wayne, 5513 Bosworth Ave., Baltimore, Md. 21207. (Land and freshwater species.)
- Gruetzmacher, Inez, 534 1st St., Menominee, Mich. 49858.

- Gugler, Carl W., Dept. Zool., Univ. of Neb., Lincoln, Neb. 68508. (Terrestrial pulmonates.)
- Gulf Coast Shell Club, c/o Mrs. J. B. Bishop, Jr., 2245 Wilson, Beaumont, Texas 77704.
- Gunter, Gordon, Gulf Coast Research Lab., Ocean Springs, Miss. 39564. (Ostreidae.)
- Haas, Dr. Fritz, 7413 S. Yates Ave., Chicago, Ill. 60649.
- Haas, Theodor, Box 1170, Church St. Sta., New York, N. Y. 10008.
- Hadley, Mr. and Mrs. F. K., Box 33, West Newton, Mass. 02165.
- *Hailey, Mr. and Mrs. Edgar J., 1525 Cypress St., Oxnard, Calif. 93032.
- Hall, Mrs. Warner L., 727 Queen's Rd., Charlotte, N. C. 28207.
- *Hamaker, Frances H., 2519 Niagara Way, Los Angeles, Calif. 90041. (Collect and exch.)
- Hamilton, Mrs. Wm. J., 615 Highland Rd., Ithaca, N. Y. 14851.
- *Hancock Library of Biology and Oceanography, Univ. of Southern Calif., Los Angeles, Calif. 90007.
- *Hand, Dr. Cadet H., Dept. Zool., Univ. of Calif., Berkeley, Calif. 94704.
- Haney, Norman P., Jr., Box 66, Esperanza, Vieques, Puerto Rico 00765. (Gastropods of Caribbean Province.)
- Hano, Philip L., 515 E. 89th St., New York, N. Y. 10028. (Rare shells.)
- **Hanselman, Lt. Col. and Mrs. G. A., P.O. Box 5288, E. San Diego Sta., San Diego, Calif. 92105.
- Hanssler, Dorothy E., 64-31 17 Pl., N., St. Petersburg, Fla. 33710.
- Harris, Capt. Marion J. and Bessie B., P.O. Box 565, Loring AFB, Limestone, Maine 04750.
- Harrison, Mrs. F. P., One Beaver St., Cooperstown, N. Y. 13326.
- Harry, Dr. Harold W., 4612 Evergreen, Bellaire, Texas 77401.
- Hassett, E. C., 225 E. 74th St., New York, N. Y. 10021. (Indo-Pacific shells.)
- *Hawaiian Malacological Society, c/o Aquarium, 2777 Kalakaua Ave., Honolulu, Hawaii 96815.
- Hayes, Alfred B., Box 4704, Christiansted, St. Croix, Virgin Islands 00821.
- Heard, Dr. Wm. and Shirley, Dept. Biol. Sci., Fla. State Univ., Tallahassee, Fla. 32301. (Land and freshwater mollusks—ecology, etc.)
- **Helber, Audrey Z. and Robt. W., Jr., 1606 Rindge Lane, Redondo Beach, Calif. 90278. (Amateurs.)
- Herrington, Rev. H. B., Westbrook Heights, Westbrook, Ontario, Canada. (Sphaeriidae.)
- Hermann, Mrs. Patricia, 1720 Nicholson Dr., # 37, Baton Rouge, La. 70802. (Land snails.)
- *Hertlein, Dr. Leo G., Calif. Academy of Sci., San Francisco, Calif. 94118.
- Hesse, Stanley H., 2245 Edgewood Ave., Bethlehem, Penn. 18017. (Shells of Cape Hatteras, N. C.)
- Hettick, Mrs. G. Riley, 933 Lynwood Dr., Bartlesville, Okla. 74003.
- Higbee, Mrs. Florence and Joan, 13 N. Bedford St., Arlington, Va. 22201.
- *Hinshaw, Merton E., Bower Memorial Museum, 2000 N. Main St., Santa Ana, Calif. 92707.
- Hirsch, Albert W. H., Sr., 3703 San Juan St., Tampa, Fla. 33609. (Cones, cowries, auger shells.)
- *Hitt, Richard E., 1210 W. Highland, Santa Ana, Calif. 92703. (Calif. and Mexican shells.)
- *Hoffman, Al, 1010 Garden St., Santa Barbara, Calif. 93101.
- Holeman, John, 314 Terrace Rd., Schenectady, N. Y. 12306.
- Holle, Dr. Paul A., 7 Mars Dr., Shrewsbury, Mass. 01545. (Salt marsh snails.)
- Hollister, Dean S. C., 201 Hollister Hall, Cornell Univ., Ithaca, N. Y. 14850.
- Homer, Sylvia, 1723 E. Second St., Brooklyn, N. Y. 11223.
- Hood, Elizabeth, 1742 Meredith Lane, Clearwater, Fla. 33516. (Mollusks and starfishes.)

- Hornstein, Leon, 2211 Arden Rd., Baltimore, Md. 21209. (Amateur.)
- *Howard, Mrs. Faye B., 4167 Creciente Dr., Santa Barbara, Calif. 93105. (Gulf of California shells.)
- Hubbard, Mrs. Stanley A., 409 McPherson St., Bremen, Ga. 30110.
- Hubricht, Leslie, 3235 23rd Ave., Meridian, Miss. 39303. (U. S. land and freshwater shells.)
- Hughes, Dr. and Mrs. W. Gordon, 189 Elm St., South Dartmouth, Mass. 02748.
- *Humme, Mrs. June H., Box 625, Kekaha, Kauai, Hawaii 96752. (Bivalves, also self-collected shells.)
- *Hunt, Helen B., 1165 Arch, Berkeley, Calif. 94708.
- Hunter, Mrs. Anne, 126 Cedar Ave., Hackensack, N. J. 07601.
- Hutchison, Richard D., 1116 Aldoro Dr., Waukesha, Wisc. 53186. (Ecology and paleoecology.)
- Imhoff, Hon. and Mrs. L. I., 1020 19th St., N. W., Washington, D. C. 20506. (General interest.)
- Ingram, Dr. Wm. M., 6640 Elm St., Mariemont, Cincinnati, Ohio 45227. (Aquatic freshwater mollusks; nuisance and pollution problems.)
- Isom, Billy G., TVA, Fish and Wildlife Br., A24, Administration Bldg., Wilson Dam, Ala. 35661. (Freshwater mollusks.)
- Israel, Mrs. P. W., 136 Hampton Roads Ave., Hampton, Va. 23361. (Conidae, also general interest.)
- Ives, Harlem B., 8401 W. Chicago Ave., Detroit, Mich. 48204.
- Jackson, Ralph W., Rt. 3, Cambridge, Md. 21613. (Land shells; exch.)
- Jacksonville Shell Club, c/o Mrs. Albert W. Raven, Jr., 6324 Pine Summit Dr., Jacksonville, Fla. 32211.
- Jacobs, George, 853 Riverside Dr., New York, N. Y. 10032. (Buy and exch. foreign land and marine shells.)
- Jacobson, Morris Karl, 455 B 139th St., Rockaway Beach, N. Y. 11694.
- James, Mrs. Frederic, 644 Westover Rd., Kansas City, Mo. 64113.
- Jensen, Mrs. Dorothy, 30-83 Crescent St., Apt. B3, Astoria, N. Y. 11102.
- Johnson, Bruce L., Rt. 5, Stillwater, Minn. 55082. (Rare shells.)
- *Johnson, Col. Harvey A., 3915 S. W. 109th St., Seattle, Wash. 98146.
- Johnson, Mrs. Kenneth L., 3206 Sussex Rd., Raleigh, N. C. 27607. (Amateur.)
- Johnson, Richard I., 124 Chestnut Hill Rd., Chestnut Hill, Mass. 02167. (Unionidae and books.)
- Johnstone, Mr. and Mrs. Harry Inge, "Palmeto," Rt. 1, Box 621, Mobile, Ala. 36605.
- Jones, Dr. David T., P.O. Box 1, Bourbonnais, Ill. 60914.
- *Jones, Ralph H., 6800 50th, N. E., Seattle, Wash. 98115. (South Pacific shells.)
- Joy, Mr. and Mrs. Frederick van B., Van Beuren Rd., Morristown, N. J. 07960.
- *Kanakoff, Geo. P., Los Angeles Museum, Los Angeles, Calif. 90007.
- Katsaras, Nick, 479 B S. Washington Ave., Bergenfield, N. J. 07621.
- Kaye, Martin B., 109 Pendleton Rd., Chesapeake, Va. 23703. (World marines, esp. *Cypraea*.)
- *Keen, Dr. A. Myra, Dept. Geol., Stanford Univ., Stanford, Calif. 94305.
- Keferl, Eugene P., 1368 Neil Ave., Columbus, Ohio 43201. (Terrestrial gastropods.)
- Kennedy, Mr. and Mrs. Douglas and Miss Caroline, 1071 Northampton St., Holyoke, Mass. 10141.
- Kettell, Rev. and Mrs. A. B., RFD 1, Unionville, Conn. 06085. (Private collection.)
- *Kile, Chas. O., Box 2046, Agana, Guam 96910. (All shells.)
- *King, David Shaw, 200 Golden Gate Ave., Belvedere, Calif. 94920. (*Voluta*, *Marginitella*, tectibranchiates.)
- *King, Dr. Homer P., Apt. 250-C, Seaview Lane, Seal Beach, Calif. 90740.

- Kingston, Harry Lea and Mrs. Harry, 1670 Fairview Dr., Beaumont, Texas 77703. (Buy and exch. world shells.)
- Kinkead, Esta, 607 Ruell, Houston, Texas 77017. (World gastropods, esp. *Conus* and *Cypraea*.)
- Klenk, Miss Liesel, 1761 Cloverdale Ave., Baton Rouge, La. 70808.
- Kline, Mr. and Mrs. Geo. F., 353 Shunpike Rd., Madison, N. J. 07940.
- *Kohn, Dr. Alan J., Dept. Zool., Univ. of Washington, Seattle, Wash. 98105.
- *Kondo, Dr. Yoshio, Bernice Bishop Museum, Honolulu, Hawaii 96819.
- Kraemer, Mrs. Louise R., Dept. Zool., Univ. of Ark., Fayetteville, Ark. 72702. (Fresh-water lamellibranchs.)
- Krouse, John A., 44 Ridge St., Manchester, Conn. 06044. (Scaphopods.)
- Kuchar, Mr. and Mrs. Jos. J., 11 Franklin Ave., Montvale, N. J. 07645.
- Kuczynski, Florence, 7400 46th Ave., N., Lot 406, St. Petersburg, Fla. 33709. (All shells; collect, exch., photograph.)
- Kurz, Richard M., 2824 N. 37th St., Milwaukee, Wisc. 53210. (Specimen shells.)
- *Lafayette, Florence, 5349 Robertson Ave., Carmichael, Calif. 95608. (*Cypraea*; world shells; exch.)
- Lamberts, Dr. Austin and Evangeline, 1520 Leffingwell, N. E., Grand Rapids, Mich. 49505.
- Landsee, Mrs. C. G., 963 Fair Meadow Rd., Memphis, Tenn. 38117. (All shells, esp. *Murex*, *Conus*, *Voluta*.)
- Lange, Dr. W. Harry, Div. of Entomology and Parasitology, College of Agriculture, Univ. of California, Davis, Calif. 95616.
- *LaRivers, Dr. Ira, Dept. Biol., Univ. of Nev., Reno, Nev. 89504. (Great Basin fresh-water mollusks.)
- LaRocque, Dr. Aurele, Dept. Geol., Ohio State Univ., 125 S. Oval Dr., Columbus, Ohio 43210.
- **Larson, Douglas A. and Mary R., 2112 Gill Dr., Concord, Calif. 94520. (Amateurs.)
- Lawler, David, 680 Queen St., Bridgeport, Conn. 06606. (*Cypraea*.)
- Lawrence, Mrs. Kay, 88 Siders Pond Rd., Falmouth, Mass. 02540. (*Pecten* and wentle-traps.)
- Lawson, Arthur and Selma, 2600 Pass-a-Grille Way, Box 6882, Pass-a-Grille, Fla. 33741. (Specimen shells.)
- Leslie, Theodore, 883 Craig St., Belize, British Honduras.
- Lewis, Dr. and Mrs. John R., 4915 Northcott Ave., Downers Grove, Ill. 60515. (*Murex*.)
- Lewis, Mr. and Mrs. Kenneth R., 1221 Crane Dr., Cherry Hill, N. J. 08034. (Amateurs.)
- Light, Frank B., Jr., Wyoming Seminary, Kingston, Penn. 18704. (Collector.)
- Lineaweaver, Mrs. Chas. B., 720 Park Ave., New York, N. Y. 10021.
- *Long Beach Shell Club, c/o Mrs. Ralph Hall, 5246 E. Florence Ave., # 95, Bell, Calif. 90203.
- *Long, Mary E., 36 W. Lytton St., Sonora, Calif. 95370. (Marine shells.)
- **Loosanoff, Dr. and Mrs. Victor, 3 Benton Court, Tiburon, Calif. 94920.
- Lowry, Walter G., Jr., 5404 Overlook Dr., Rt. 1, Raleigh, N. C. 27602.
- Luttrell, Mr. and Mrs. A. L., Wall Lane and Old Georgetown Rd., Rockville, Md. 20852. (Marines and fossils.)
- MacBride, Grace, R.D. 1, Hartman Rd., North Wales, Penn. 19454.
- MacLeod, Dr. Malcolm L., 14201 N. W. 17th Ave., Miami, Fla. 33168.
- MacMillan, Gordon K., 169 Glenfield Dr., Pittsburgh, Penn. 15235.
- Maes, Mrs. Robt. A., Dept. Mollusks, Academy of Nat. Sci., Philadelphia, Penn. 19103.
- Malek, Dr. Emile A., Tulane Univ. School of Med., Dept. Tropical Med., New Orleans, La. 70112. (Medical malacology.)
- Malick, Donald, 5514 Plymouth Rd., Baltimore, Md. 21214. (Fossils—buy, sell, exch.)

- Malone, Elsie, Sanibel Island, Fla. 33957. (Buy, sell, exch. world shells.)
- Mancebo, Servio Tulio, Intendente General, Universidad Autonoma de Santo Domingo, Republica Dominicana.
- Marcott, Mrs. Edna, 4545 77th Way, N., St. Petersburg, Fla. 33710. (Dredged Gulf of Mexico minute shells; Pliocene fossils.)
- *Marquardt, Bruce, 4697 White Oak Ave., Encino, Calif. 91316.
- Marsh, Mrs. Theresa C., 1140 N. E. 24th Ave., Apt. C, Pompano Beach, Fla. 33062. (Southeastern Florida marines; worldwide colorful bivalves.)
- *Marshall, Mrs. Thos. H., 2237 N. E. 175th St., Seattle, Wash. 98155. (World shells; exch.)
- Matteson, Dr. Max R., Dept. Zool., Univ. of Ill., Urbana, Ill. 61803.
- Mauseth, E. L., Alden, Minn. 56009. (All shells.)
- McCallum, Gladys, Meadowvue Dr., Rt. 2, Wexford, Penn. 15090.
- *McCammon, Mrs. Leonard J., 16570 Garden Lane, Las Gatos, Calif. 95030. (Gastropods of the California coast; ecology.)
- McCarty, Col. Wm. A., 12447 32nd St., Omaha, Neb. 68123.
- McClary, Andrew, Dept. of Nat. Sci., Mich. State Univ., East Lansing, Mich. 48823. (Behavior of gastropods.)
- *McClure, Mrs. Virginia H., 317 S. Wetherly Dr., Beverly Hills, Calif. 90211.
- McCraw, Dr. Bruce M., Ont. Veterinary College, Guelph, Ontario, Canada.
- McDougall, Mrs. Grace, 16 Baxter Ave., New Hyde Park, N. Y. 11040.
- McElya, Norris, Box 4794, Miami, Fla. 33101. (Florida shells.)
- McEvilly, John, Apt. 5H, 382 Dayton St., Newark, N. J. 07114.
- McGinty, Thos. L. and Paul L., Box 765, Boynton Beach, Fla. 33435.
- McGlamery, Miss Winnie, Alabama Museum of Nat. Hist., University, Ala. 35486.
- *McLean, Jas. H., Los Angeles County Museum, Los Angeles, Calif. 90007. (Ecology and functional anatomy.)
- *Mead, Dr. Albert R., Dept. of Zool., Univ. of Ariz., Tucson, Ariz. 85702. (Terrestrial snails and slugs; Giant African Snail.)
- Menninger, Dr. and Mrs. Wm. C., Box 829, Topeka, Kan. 66601.
- Merdes, Lucille E., 8449 86th Ave., Woodhaven, N. Y. 11421. (World marine shells.)
- Merren, Mrs. E. J., 2601 6th St., Pt. Arthur, Texas 77640.
- Merrill, Dr. Arthur S., Bureau Comm. Fisheries, Biol. Lab., Oxford, Md. 21654.
- Merritt, Mr. and Mrs. Jack H., 2251 Euclid Ave., Ft. Myers, Fla. 33901.
- *Messing, Mrs. Elsie C., 5024 Vee St., Sacramento, Calif. 95817.
- Meyer, Mr. and Mrs. Harvey A., 3320 Garden Dr., Fountain City, Tenn. 37918. Winter: Captiva, Fla. 33924.
- Michelson, Dr. Edw. H., 46 Charles St., Natick, Mass. 01760. (Medical malacology.)
- Miles, Dr. Chas. D., Dept. of Biol., Univ. of Mo. at Kansas City, Kansas City, Mo. 64141.
- *Miller, Walter B., 5974 E. Edison St., Tucson, Ariz. 85716.
- Moberg, Capt. and Mrs. A. G., Keene Rd., RFD 154, East Freetown, Mass. 02717.
- Mohorter, Willard, Standard Publishing Co., Cincinnati, Ohio 45231. (Field collecting *Cypraea*, *Murex*, *Pecten*, *Voluta*.)
- Moore, Dr. Donald R., Marine Lab., Univ. of Miami, 1 Rickenbacker Causeway, Miami, Fla. 33149.
- Moore, Dr. Geo. M., Dept. Zool., Univ. of N. H., Durham, N. H. 03824. (Nudibranchs of New England.)
- Moore, Wm. S., 3022 S. 21st St., Omaha, Neb. 68108.
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- *Morrison, Roy L., 3745 Grim Ave., San Diego, Calif. 92104.
- Morton, Mrs. E. James, 6 Orchard St., Wellesley Hills, Mass. 02181. (Marine mollusks.)
- *Mousley, Louis B., 35350 Panorama Dr., Yucaipa, Calif. 92399.

- Mugdudge, Edith H., c/o "Glory of the Sea," Sanibel Island, Fla. 33957. (Specimen shells.)
- Muirhead, Miss Mary Agnes, 27 S. Monterey Dr., Hope Pastures, Kingston, Jamaica, B. W. I. (Marine mollusks.)
- Munro, Bonnie Lee, 1215 Mulberry, Mt. Carmel, Ill. 62863. (Marine shells.)
- Murphy, Mrs. Priscilla, Sanibel Island, Fla. 33957. (World shells.)
- Murray, Mrs. Francis A., 11 Old Orchard Rd., New Rochelle, N. Y. 10804.
- Murray, Dr. Harold D., Biol. Dept., Trinity Univ., San Antonio, Texas 78212. (Unionidae, distribution and parasites.)
- Musial, Mr. and Mrs. Eugene, 53 Idlewood Dr., Tonawanda, N. Y. 14151.
- Myer, Dr. Donal G., Southern Ill. Univ., Alton, Ill. 62004. (Land snails.)
- *Myhre, Idelle E., 10638 Ledeen Dr., Lake View Terrace, Calif. 91342.
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- Newman, Jess L., Nag's Head, N. C. 27959.
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- Nicol, Dr. David, Dept. of Geol., Univ. of Fla., P.O. Box 14463, Univ. Sta., Gainesville, Fla. 32603.
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- *No. Calif. Malacozoological Club, Dept. Zool., Univ. of Calif., Berkeley, Calif. 94720.
- N. Carolina Shell Club, c/o Hugh Porter, Fisheries Res. Inst., Morehead City, N. C. 28557.
- *Nolan, James I., P.O. Box 1013, Pago Pago, American Samoa. (*Cypraea*.)
- Norton, Mr. and Mrs. LeRoy, Presque Isle, Maine 04769. (Freshwater mollusks.)
- Notter, Miss Helen, 2529 Gilmore St., Jacksonville, Fla. 32204.
- Novak, Mildred M., 3456 A Keokuk St., St. Louis, Mo. 63118. (*Murex*, *Voluta*, corals.)
- Old, Wm. E., Jr., Dept. Mollusks, Am. Mus. Nat. Hist., Central Park W. at 79th St., New York, N. Y. 10024.
- *Olivera, Baldomero, Jr., Dept. Chemistry, Cal-Tech, Pasadena, Calif. (Philippine shells.)
- Olsson, Axel A., 1906 Ferdinand St., Coral Gables, Fla. 33134. (Mollusca, fossil and Recent.)
- Oppenheimer, Ella H., M.D., 7703 Crossland Rd., Baltimore, Md. 21208.
- *Ostergaard, Prof. Jens M., 417 Del Medio Ave., Mountain View, Calif. 94041.
- Ostheimer, Alfred J. III, 1510 Chestnut St., Philadelphia, Penn. 19102.
- Ostheimer, Ruth E. M., 146 S. Whitford Rd., Whitford (Exton P.O.), Penn. 19341.
- Oswald, Mrs. Robt., 11329 Mosley Lane, St. Louis, Mo. 63141. (Minute world gastropods.)
- *Pacific Northwest Shell Club, c/o Ann Smiley, Rt. 1, Box 185, Ridgefield, Wash. 98642.
- *Pacific Shell Club, Los Angeles County Museum, Los Angeles, Calif. 90007.
- Paddison, Mrs. W. H., 3100 Broadway Blvd., Birmingham, Mich. 48708.
- Pagmam, Wm., 6a Calle "A," 7-65 Zone 9, Guatemala City, Guatemala.
- Paleontological Research Insitution, 109 Dearborn Pl., Ithaca, N. Y. 14850.
- Palm Beach County Shell Club, c/o John Root, 718 Iris St., West Palm Beach, Fla. 33401.
- Palmer, Dr. E. Laurence, 206 Oak Hill Rd., Ithaca, N. Y. 14850.

- Palmer, Dr. Katherine V. W., Paleontological Research Inst., 109 Dearborn Pl., Ithaca, N. Y. 14850.
- Parodiz, Dr. and Mrs. Juan J., Sect. of Invertebrates, Carnegie Museum, Pittsburgh, Penn. 15213. (Neotropical mollusks and freshwater gastropoda of U.S.A.)
- Parsons, Dr. and Mrs. John W., 324 Taplow Rd., Baltimore, Md. 21212. (Western Atlantic sp.)
- Pasternack, Dr. and Mrs. Richard, 1224 Seminole Dr., Ft. Lauderdale, Fla. 33304.
- Patterson, Charlotte M., Univ. of Mich. Zool. Museum, Ann Arbor, Mich. 48104. (Freshwater and land snails.)
- *Paulson, Mrs. Marianna, 2126 Spaulding St., Berkeley, Calif. 94703.
- Perlman, Mrs. Anthony, 6108 Ivydene Terrace, Baltimore, Md. 21209.
- Peterson, Mrs. Ethel, 810 N. "D" St., Indianola, Iowa 50125. (Collect and classify shells.)
- Petit, Julien V., M.D., 5541 Woodlawn Blvd., Minneapolis, Minn. 55417.
- Petit, Mr. and Mrs. Richard, Box 133, Ocean Drive Beach, S. C. 29582. (World shells.)
- Phelps, Mrs. Guy, Briny Breezes Park, Delray Beach, Fla. 33444. (General interest.)
- Philadelphia Shell Club, Academy of Nat. Sci., Philadelphia, Penn. 19103.
- *Phillips, Mr. and Mrs. Ted, 4580 Nueces Dr., Santa Barbara, Calif. 93105.
- Phillips, Walter H., St. Thomas Harbour, St. Thomas, Virgin Islands 00801.
- Plummer, Mrs. Berniece, 47 Tulane Parkway, Rochester, N. Y. 14623.
- Poling, Jas. W., 400 E. 59th St., New York, N. Y. 10022.
- Porter, Mr. and Mrs. Dan, Hudson House, Ardsley-on-Hudson, N. Y. 10503.
- Porter, Hugh J., Inst. Fisheries Research, Morehead City, N. C. 28557. (Systematics on the culture of bivalves.)
- Porter, Mrs. Mitiam E., 831 McKenzie St., York, Penn. 17403.
- Potter, Lawrence, 15 Rogers Ave., Bellport, N. Y. 11713. (Western Atlantic *Conus* and *Voluta*.)
- Potter, Mrs. A. Leslie, 6350 Main St., Williamsville, N. Y. 14221.
- Powell, Mrs. Betty, Betty's Hawaiian Village, Sanibel Island, Fla. 33957.
- Powell, Richard, The Shell Factory, Box BB, Ft. Myers, Fla. 33902.
- Proetz, John B., Box 334, Boynton Beach, Fla. 33435.
- Ptolemy, Mrs. Wm. R., 220 Sanatorium Rd., Hamilton, Ontario, Canada. (Collect, exch. world shells.)
- Pulley, Thos. E., Museum of Nat. Hist., Houston, Texas 77001.
- Raeihle, Mr. and Mrs. Geo., 7924 Ankener Ave., Elmhurst, N. Y. 11373.
- Raines, Mrs. H. Taylor, 5890 Estero Blvd., Ft. Myers Beach, Fla. 33931.
- Ramsaran, Jo-Carol, 510 W. Clark, Clarinda, Iowa 51632.
- Rawls, Dr. Hugh C., Eastern State College, Dept. Zool., Charleston, Ill. 61920. (Ecology, taxonomy, distribution of land snails.)
- Reader, Mr. and Mrs. Wm. R., 4772 49th Ave., N., St. Petersburg, Fla. 33714. (Live mollusks.)
- Reed, Murry E., 162 19th Ave., N. E., St. Petersburg, Fla. 33704.
- Rheder, Dr. Harald A., U. S. Natl. Museum, Washington, D. C. 20560.
- *Rex, Miss Edith R., 620 Redondo Ave., Long Beach, Calif. 90803.
- *Rice, Thos. C., Rt. 2, Box 483, Poulsbo, Wash. 98370. (All shells; exch.)
- Richards, Mrs. G. Gardner, 302 Meehan Ave., Philadelphia, Penn. 19119. (General interest.)
- Richards, Dr. Horace G., Academy of Nat. Sci., Philadelphia, Penn. 19103.
- *Richart, Mae Dean, 15 Moffitt St., San Francisco, Calif. 94131. (West coast shells.)
- *Richmond, Mrs. Ruth, 222½ Reeves Dr., Beverly Hills, Calif. 90212. (*Murex*, *Spondylus*.)
- Rios, Dr. E. C., Caixa Postal Museu Oceanografico, 379 Praca Tamandare—Rio Gr., Rio Grande do Sul, Brazil. (Marine shells.)
- *Risser, Okla. Sci. and Arts Found., Inc., 3000 W. Gen. Pershing Blvd., Fair Park, Oklahoma City, Okla. 73101. (Marine gastropods.)

- *Robb, Gaynelle A., 431 Acacia Drive, Apt. D, Vacaville, Calif. 95688. (*Murex*, *Cypraea*.)
- *Roberts, Mrs. Ted R., 2839 S. W. Champlain Dr., Portland, Ore. 97201.
- Robertson, Dr. Robert, Dept. of Mollusks, Academy of Nat. Sci., Philadelphia, Penn. 19103.
- Robinson, Geo. D., 5347 Dartmouth Ave., N., St. Petersburg, Fla. 33710. (Collect, buy, sell, exch.)
- Rochester Shell and Shore Club, c/o Berniece Plummer, 47 Tulane Pkwy., Rochester, N. Y. 14623.
- Rompel, Nobel M., 309 N. Fayette St., Washington Courthouse, Ohio 43160.
- Root, John, P.O. Box 182, West Palm Beach, Fla. 33402. (Pearly shells.)
- Root, Townner B., P.O. Box 272, Winter Park, Fla. 32790. (Florida marine shells and fossils.)
- Roscoe, Mr. and Mrs. Ernest B., 5315 S. Cornell Ave., Chicago, Ill. 60615.
- Rosentreter, Mr. and Mrs. Howard W., 514 Capitol Blvd., Elkhart, Ind. 46514. (Patellidae.)
- Rosewater, Dr. Joseph, Div. of Mollusks, U. S. Natl. Museum, Washington, D. C. 20560. (Systematics; freshwater and marine.)
- *Roth, Barry, 2140 Middlefield Rd., Palo Alto, Calif. 94301. (Pacific coast marine shells.)
- *Roworth, Edwin C., 1301 Windsor Dr., Cardiff-by-the-Sea, Calif. 92007. (World shells and sea life.)
- Roy, Dr. Edward C., Jr., Shell Oil Co., Corpus Christi, Texas 78403. (Invertebrate paleontology; nonmarine mollusks.)
- Ruehl, Thos. C., 490 W. 187 St., New York, N. Y. 10033. (*Murex*; *Voluta*; *Conus*.)
- Russell, Dr. Henry D., Springdale Ave., Dover, Mass. 02030.
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- Scribner, Mrs. Geo., 333 Reserve St., Boonton, N. J. 07005. (Collector; shell arrangements.)
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- *Univ. of Ariz. Library, Tucson, Ariz. 85702.
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- Witt, Mrs. Elizabeth, Dept. of Mollusks, Acad. of Nat. Sci., Philadelphia, Penn. 19103.
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- British Museum Dept. Printed Books, W.C.1, London, England.
- British Museum of Nat. Hist. General Library, London, S.W.7, England.
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- Malacological Society of Australia, 351 Glenferrie Rd., Malverne, Melbourne, Australia.
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- National Lending Library for Science and Technology, Accessions Dept., Boston Spa, Yorkshire, England.
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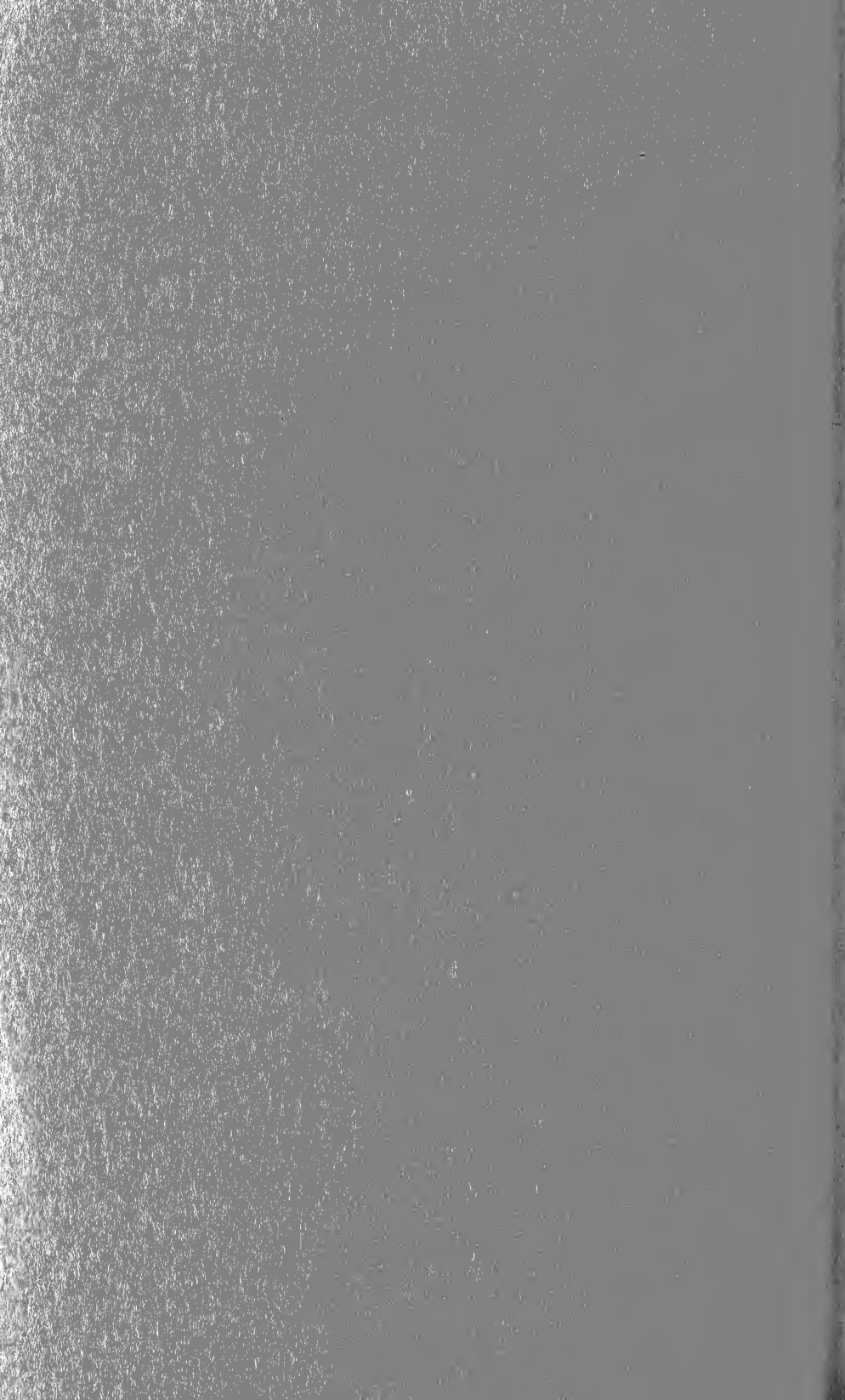
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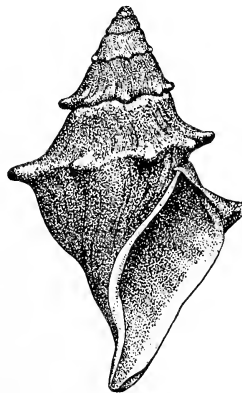
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Bulletin number 32, December 1, 1965. Issued Annually by the American Malacological Union, Inc. Editorial Board: Morris K. Jacobson, Editor, Margaret C. Teskey, Secretary. Office of Publication: Route 2, Box 318, Marinette, Wisconsin 54143

THE THIRTY-FIRST ANNUAL MEETING OF THE AMERICAN MALACOLOGICAL UNION

Staten Island, New York

July 20-23, 1965

It was good to be back on Staten Island, especially good to be greeting old friends in the remembered setting of a decade ago. There were the inevitable changes; friendly little Wagner College has expanded to the point where unfamiliar buildings now partially obscure the unexcelled view of the world's busiest harbor. Mighty Verrazano Narrows Bridge already is reducing the rustic isolation of the Island with its quaint Dutch-sounding villages, and finally, many of the old friends who attended the 1955 meeting have departed forever.

But the newcomer to Wagner in 1955 is an old friend now, and as always the evening before opening day was to bring joyful reunions. Comfortable chairs on a broad verandah, a balmy breeze that was to usher in four days of perfect weather, and a fairyland of lights far below that appeared with the twilight—small wonder that everyone was reluctant to leave the Utopian setting for such a mundane thing as sleep.

Morning brought people, then more people, and the registration desk presided over by busy Mathilde Weingartner went into high gear. The program provided each registrant was attractively embellished by a line drawing of living *Busycon carica* Gmelin, the work of Anthony D'Attilio and further enhanced by being in a handy folder together with area maps.

At 1:30 P.M. and right on schedule President Juan J. Parodiz rapped his gavel to open the meeting, then introduced Dr. Adolph J. Stern, Dean of Wagner College.

Dean Stern began with a brief résumé of his school; it was founded in 1883 in Rochester, New York by the Lutheran Church and is now growing rapidly, as attested by new and already crowded dormitories. It is planned, said he, to keep the registration below 2,000.

"I am so pleased that you came back to Wagner," he said, "But so sorry that you have just missed seeing our new Science Hall, to be completed in 1966. They promised me a science building when I came here 24 years ago and finally it is coming. And by the way, I retire next year!"

In replying to Dr. Stern's welcome Dr. Parodiz reminded his listeners that at the time of the former meeting at Wagner College Dr. Pilsbry was here, and that Germaine Warmke had talked of Puerto Rico and of her new book on Puerto Rican shells.

"And now we have a full program and a tight schedule; please watch your allotted time!" With this admonition, he introduced the first speaker:

ON THE FAMILIES OF TURRIDAE. J. P. E. Morrison, U.S. National Museum, Washington, D.C.

(Abstract)

The current classification of the Turridae is incomplete and misleading. While making radular slides for the late Paul Bartsch's unfinished studies on

the group a score of years ago, the extreme differences in radulae crystallized into a logical pattern. The most primitive radular type in this complex is complete, on a ribbon, in a pharyngeal bulb.

The family Turridae, subfamily Drilliinae, has a radular formula of 2-1-1-1-2 (on a ribbon) that is not toxoglossate. Species of the genera *Clavus*, *Drillia*, *Tylotia*, *Eldridgea*, *Spirotropis*, *Lissodrillia*, *Cerodrillia*, and *Kylix*, among others, have been proven to belong to this group by their radular structure.

Members of the subfamily Clavatulinae have the radular formula 2-0-1-0-2. They have lost the broad multicuspid laterals. Species belonging to the genera *Clavacula*, *Antiplanes*, *Aforia*, *Ancistrosyrinx*, *Surcula*, *Irenosyrinx*, and *Turricula* possess this type of radula with centrals and the duplex marginals only.

The subfamily Lophiotominae or Crassispirinae possesses a radula with only the duplex marginals (formula 2-0-0-0-2). This group includes species of the genera *Lophiotoma*, *Cryptogemma*, *Megasurcula*, *Leucosyrinx*, *Carinodrillia*, *Fusiturricula*, *Monilispira*, *Burchia*, and *Crassispira*, as well as others whose generic allocation is unknown to me.

The second family involved has no odontophore or radular membrane in a pharyngeal radular bulb. Instead, the teeth are produced singly in a radular sac, opening off the left side of the pharyngeal tube. These are truly toxoglossate snails with teeth delivered and used singly as in the Conidae. The teeth of the most primitive members of the family Mangeliidae resemble partially rolled up willow leaves. More specialized members have teeth rolled into complete and functional (hypodermic needle) tubes, to paralyze their prey before swallowing it whole.

The Family Mangeliidae includes species currently listed as members of the genera *Bela*, *Mangelia*, *Kurtziella*, *Clathromangelia*, *Inodrillara*, *Phymorhynchus*, *Oenopota*, *Propebela*, *Inquisitor*, *Taranis*, *Mitromorpha*, and *Glyphostoma*.

Just to prove the complexity of the old "family Turridae," a third type of radula, completely unrelated in structure and function, is known for the Pseudomelatominae. The solid radular teeth on a membrane (formula 1-1-1) relate members of the genera *Pseudomelatoma* and *Hormospira* to a subfamily of the Muricidae or of the Thaisidae. They have no direct relationship whatsoever with either the Turrid or Mangeliid families.

This paper was illustrated by projected radular drawings for which Dr. Morrison apologized, saying they were made 24 years ago. Much more work is needed, said he, with anatomy studies especially essential.

SMALL BEGINNINGS. Adlai B. Wheel, Syracuse Boys Club, Syracuse, N.Y.

Mr. Wheel's perennial title concerned his perennial subject, the problems of the adolescent boy and the speaker's efforts to channel interest along scientific lines. His long anticipated project of a new museum building finally a fact, Mr. Wheel pleaded his need for discarded or surplus material to interest active young scientists whose ages range from eight to twelve.

Kodachrome slides depicting scenes inside the new museum were shown, and Mr. Wheel concluded by expressing his satisfaction that among the former members of his Boys Club are four geologists and a medical missionary.

PRELIMINARY REMARKS ON THE LAND MOLLUSKS OF NICARAGUA. Morris K. Jacobson, Associate, American Museum of Natural History, New York City.

(Abstract)

An examination of the literature and of several museum collections shows that about 70 species and subspecies of land shells have been reported as occurring in Nicaragua. No fewer than 21 of these have been recorded from nowhere else, but one would hesitate to call most of these endemic. Further collecting in Central America and southern Mexico will most probably disclose that most of the apparent endemics, with the exception of a few localized calciphilous species like *Mexcyclotus chrysacme* (Bartsch and Morrison) and *Chondropoma callipeplum* Solem, have a wider distribution.

The Nicaraguan land shell fauna, as von Martens pointed out (1901), is characterized by comparative impoverishment. "*Eucalodium*, *Coelocentrum*, and *Omphalina* are absent; *Polygyra* is represented by one species only [*P. dysoni* Shut. in Honduras], and the Cyclophoridae, *Euglandina*, *Streptostyla*, and *Ortalicus* (sic) diminish in number" (p. xxiii). There are no peculiar genera and, as Tate wrote (1869), many of the West Indian genera like *Urocoptis*, *Adamsiella*, *Megalostoma*, *Chondropoma*, *Tudora*, which are found in Mexico, Guatemala, and northern Honduras, are absent from Nicaragua and the areas to the south. (The presence of a single *Chondropoma* does not materially alter the picture.) From this, as well as from affinities of many of the Nicaraguan shells to those to the south, he concludes that in all likelihood the Nicaraguan land fauna immigrated from the south and that it forms part of the Colombian faunal zone rather than the Antillean.

Whitmore and Stewart (Science, vol. 148, 1965) showed that the presence of Miocene fossil bones of northern herbivores near the Panama Canal argues rather strongly for a Tertiary land connection of Central with North America of considerable size and stability. However, the entire Central American land mass was always subjected to considerable tectonic activity—which still continues to a degree—and it is possible that the southward migration of the herbivores could have been effected "in several stages, as water barriers appeared and disappeared in front of and behind the migrants" (p. 184). Under these conditions a slow *northward* movement of land snails from the Colombian region is not impossible.

The southern and central portions of Nicaragua have a low mountain chain running in a northeast and southwest direction through the central part of the country. It is composed of diorites and schistose rocks that upon decomposition yield a stiff, argillaceous soil. The climate is humid and there are large areas where limestone is present. Here land mollusks can be taken rather easily, but the discomfort of difficult terrain, great heat, and the constant danger of poisonous snakes, chiefly the *Matatoro* or *Fer de Lance*, and malarial mosquitoes, make collecting something less than pleasurable. The western district, on the other hand, with its parallel chains of volcanic mountains, is characterized by absorbent rocks and little rain. Grass is the chief vegetation, and the characteristic features are large savannas. Snails are not abundant either in numbers or varieties, and yet, up to now, this is the area where most collecting has taken place.

Maps, photos of collecting sites and of collectors were projected to illustrate this paper. President Parodiz remarked that he supports Mr. Jacobson's convictions as to the influence of geologic features on distribution.

THE SURF CLAM FISHERY. Arthur S. Merrill, Bureau of Commercial Fisheries Biological Laboratory, Oxford, Maryland.

(Abstract)

The fishery for the Atlantic surf clam, *Spisula solidissima* (Dillwyn), was small before 1945 (except for bait), but has since developed rapidly into an important year-round fishery. For the 10-year period 1945-1954, total production of clam meats was about 75 million pounds. Production has increased threefold in the past decade; about 250 million pounds of meats were marketed in 1955-1964. Today the demand for surf clam meats is at an all-time high—about 38 million pounds were taken during each of the past 2 years. The meats are used principally for fried clams and in making fresh or canned chowder. Canned clam broth is a by-product. The meat also is excellent fish bait.

The surf clam ranges from Labrador to the Gulf of Mexico and is found in commercial quantities in certain areas of the Middle Atlantic bight from Long Island to Cape Hatteras. At present most of the catch is from a limited area between Pt. Pleasant and Cape May, New Jersey, although stocks north and south of this area were fished in earlier years. The clams are captured in depths less than 20 fathoms with special hydraulic dredges that plow into the substrate. The dredges are towed from 60- to 80-foot vessels which make 1-day trips. Several hundred bushels are taken each trip, to be shucked ashore.

Abundance and recruitment of clams, and location of commercial surf clam beds, are not adequately known. Therefore, members of the growing surf clam industry are properly concerned about the possible depletion of the resource. At the request of industry, the Bureau of Commercial Fisheries has recently undertaken studies of current and impending problems.

The Bureau's Exploratory Fishing and Gear Research Base at Gloucester, Massachusetts, is carrying out exploration and gear improvement. Several areas of the continental shelf have been minutely examined. Continued explorations are in progress to provide a comprehensive survey of the resources of the region. In addition, work has begun on the development of an instrument for detecting the presence of surf clams in the sediment and evaluating the efficiency of the commercial collecting gear.

The Bureau's laboratory at Oxford, Maryland, carries out biological research on surf clams. Fishery statistics collected from interviews at key ports on the coast are analyzed. Data are collected by periodic sampling of the surf clam grounds with a research vessel. These data are necessary to determine the production potential of the grounds, to establish the availability of present and pre-recruit year classes, and ultimately to offer recommendations on the number of clams that can be removed without the risk of depletion. An understanding of the population dynamics of the fishery also necessitates studies of growth and mortality. A comprehension of the basic biology of the surf clam is required to interpret growth

phenomena. Thus, studies of gametogenesis and spawning, culturing of larvae, and collecting of juveniles for research on early life history are needed. Furthermore, a knowledge is required of the factors involved with annual ring formation, and the influence of season, area, and other environmental conditions on length-weight ratios.

Research in the recently developed surf clam program is proceeding rapidly. Reports of progress are given at meetings such as this, at conferences with industry, and through publications.

The slides accompanying this paper were of dredge boats and their gear and of specimens marked for identification and growth studies.

Dr. Merrill was asked if other creatures than clams came up in the nets; he replied that anything that did not fall back through a two-inch mesh came aboard, to be discarded or retained if of unusual interest.

Mr. John Q. Burch raised the question as to possible depletion and Dr. Merrill said that in making over 400 stations between Cape Cod and Cape Hatteras many new beds were discovered which will hold up under commercial fishing for the next several years.

CONVERGENCE OF AN ACENTRIC SCULPTURAL TRAIT IN THE TELLINACEA. Kenneth J. Boss, Bureau of Commercial Fisheries Ichthyological Laboratory, U. S. Fish and Wildlife Service, Washington, D.C.

(Abstract)

The occurrence of a peculiar kind of external superficial sculpture, herein termed scissulate, has been documented in several families of the Tellinacea, including the Donacidae, Gariidae, Semelidae, and Tellinidae. The species of at least 10 phyletically separate and distinct subgenera or genera exhibit this unique differential sculpture.

The most notable interfamilial convergence is that found between the semelid *Iacra* and the tellinid *Strigilla*. In species of these genera, not only is the scissulate sculpture similar, but the shape of the shell and the configuration of the pallial musculature are very much alike. Only the distinctive internal resilium of *Iacra* serves to differentiate its representative species from those of *Strigilla*.

Within the family Tellinidae, acentric sculpture occurs in no less than six independent generic or subgeneric lineages. The macomoids, *Scissulina*, *Temnoconcha*, *Jactellina*, and *Loxoglypta*, and the tellinoids, *Scissula*, *Strigilla*, and *Fabulina* have representative species with the distinctive trait.

To explain this remarkable incidence of convergence, the natural habits of members of the Tellinacea are reviewed. It is concluded that as infaunal members of the benthos, the Tellinacea are specialized deposit feeders which normally assume a horizontal position in sandy substrates. In most species, particularly in the family Tellinidae, there is an adaptive posterior flexure of the shell to the right side of the animal which is directed toward the surface of the substrate and from which the incurrent siphon emerges to draw in detritus. Further, in two independent subgenera of separate subfamilies, the widely distributed Indo-Pacific macomoid, *Macoma* (*Scissulina*) *dispar* (Conrad) and the European tellinoid, *Tellina* (*Fabulina*) *fabula*

Gmelin, only the right valve possesses the peculiar acentric sculpture. Since the structure of the acentric sculptural pattern is such as to offer a resistance to posteriorly directed movements by interlocking with the sand grains of the substrate, it is postulated that the scissulations are of value in the maintenance of the animal's position in the substrate when the siphons are being withdrawn. On the other hand, anteriorly directed movement, such as that generated by the extension of the foot and the coordinated contraction of the pedal musculature, is not diminished by the presence of the peculiar sculpture.

Since the acentric trait did not appear until relatively recently in the fossil record, it is most probable that the species of a number of different lineages within the superfamily have adapted to this peculiar form of sculpture which may aid the animal in its subsurface locomotion and its position in the substrate.

(The author wishes to thank Mr. Kjell Sandved who photographed some of the specimens used to illustrate this talk.)

This paper was accompanied by slides illustrating structure, sculpture and anatomy studies; the following discussion ensued:

Jacobson: "How about the chevron markings on *Divaricella*?" Boss: "Yes, there is a peculiar acentric sculpture on the lucinid *Divaricella*, but I am not certain about the position which *Divaricella* assumes in the substrate. Other non-tellinaceans have acentric sculpture, the protobranch *Acila*, for example." Burch: "Have you checked bathymetric distribution? I've dredged *Tellina* at 100 fathoms; do they go deeper?" Boss: "Yes, we've taken them at 600 fathoms." Burch: "We dredged them from mud and all kinds of substrate, all the way down to 100 fathoms; it's very puzzling." Steger: "Are the markings only on the right valve?" Boss: "Only in two species of the Tellinidae, namely *Scissulina dispar* of the Indo-Pacific and *Fabulina fabula* of Europe." Steger: "Are there any of these in our waters?" Boss: "Not to my knowledge."

COELENTERATE-ASSOCIATED PROSOBRANCH GASTROPODS.¹ Robert Robertson, Academy of Natural Sciences of Philadelphia, Pennsylvania.

(Abstract)

Nematocysts presumably protect coelenterates from most animals which might otherwise feed on them. Nevertheless, there are animals in various groups which feed in whole or in part on the soft, nematocyst-bearing, living tissues. Many associates of hydroids, sea anemones, and corals feed on their hosts.

Among the prosobranch gastropods, 21 genera in seven families are now known that include such associates:

ARCHITECTONICIDAE [= "Solaridiidae"] (*Heliacus* [= "*Torinia*"] with the zoanthids *Palythoa* and *Zoanthus*).

EPITONIIDAE [= "Scalidae"] (*Alexania* [= "*Habea*"], *Epitonium*, *Opalia*, and *Amaea* with sea anemones, zoanthids, and stony corals).

JANTHINIDAE (*Janthina* with pleustonic siphonophores and sea anemones on *Sargassum*; *Recluzia* with *Minyas*, a pleustonic sea anemone).

¹ The field work in the Indian Ocean was supported by the National Science Foundation as a part of the U.S. Program in Biology, International Indian Ocean Expedition.

LAMELLARIIDAE (*Velutina plicatilis* with hydroids in Europe).

OVULIDAE [= "Amphiperatidae"] (*Simnia*, *Primovula*, *Neosimnia*, *Cyphoma*, *Calpurnus*, and *Ovula* with gorgonians, soft corals, and rarely hydroids; *Pedicularia* with hydrocorals and doubtfully stony corals).

CORALLIOPHILIDAE [= "Magilidae" & "Rapidae"] (*Coralliophila*, *Quoyula*, *Leptocoenchus* and *Magilus* with stony corals, zoanthids, and gorgonians; *Rapa* with soft corals).

COLUMBELLIDAE (*Nitidella nitida* with the sea anemone *Stoichactis helianthus* in the West Indies).

Most of these prosobranchs are known to feed on the living tissues of their hosts, but none are as specialized for this habit as are the aeolid nudibranchs. In the Architectonicidae, only *Heliacus* spp. are known coelenterate-(zoanthid-) associates; nothing is yet known about the food and possible associations in other genera in the family. Lamellariidae other than *Velutina plicatilis* are mostly tunicate-associates. In the Columbelloidea, *Nitidella nitida* is exceptional; whether it feeds on its anemone host is unknown; other columbellids are nonspecialized carnivores or even herbivores (Marcus, 1962). Associations with coelenterates involving feeding are so prevalent in the other four families (Epitoniidae, Janthinidae, Ovulidae, and Coralliophilidae) that the habit may virtually be characteristic of each entire group. However, *Janthina* is so voracious that it will swallow noncoelenterate foods—there even is cannibalism (Bayer, 1963)—and the larger epitoniids commonly forage for smaller coelenterates. Epitoniids have a cuticularized esophageal lining which may prevent injury from nematocysts. Coralliophilids have no radula or jaws; seemingly, penetration of coral tissues is aided by salivary secretions, and the muscular proboscis functions as an ingesting pump (J. Ward, 1965). Otherwise, there are few obvious anatomical specializations.

In 1964, I spent from January to May in the Indian Ocean, where I made general collections of marine mollusks and observed prosobranchs associated with coelenterates in three areas: near Central Marine Fisheries Research Institute, Mandapam Camp (coast of Gulf of Mannar), S.E. India; Beruwala and Galle, S.W. Ceylon; Maldive Islands.

Locality	Prosobranch	Coelenterate host
S.E. India	<i>Alexania</i> sp.	<i>Anthopleura</i> sp. [a sea anemone]
" " "	<i>Epitonium</i> 3 spp.	" " " " "
S.W. Ceylon	<i>Calpurnus verrucosus</i> (Linn.)	soft corals
" " "	<i>Calpurnus lacteus</i> (Lamarek)	" "
Ceylon and Maldives	<i>Coralliophila</i> cf. <i>C. sugimotoi</i> Kuroda, 1930-31	<i>Palythoa</i> sp. [a zoanthid]
" " "	<i>Epitonium</i> sp.	" " " "
Maldives	<i>Heliacus trochoides</i> (Deshayes)	<i>Palythoa tuberculata</i> (Esper)
"	<i>Epitonium</i> sp.	<i>Fungia</i> [a stony coral]
"	<i>Amaea</i> sp.	<i>Tubastraea aurea</i> (Quoy & Gaimard) [a stony coral]

The *Epitonium* with *Palythoa* in Ceylon and the Maldives is the first epitoniid to be found with a zoanthid. The shell and body of the Maldivian *Amaea* was bright orange in life, and its coral host was similarly colored.

Much remains to be learned about coelenterate-associated prosobranchs; for example: their taxonomy and zoogeography, their specificity and their methods of feeding without injury from nematocysts. Architectonicid, ovulid, and coralliophilid larvae occur in tropical plankton far from shallow-water benthic sources, so there are also interesting problems in larval ecology—especially the location of and settlement on appropriate hosts.

Illustrated by slides showing mollusks feeding on their coelenterate hosts, collecting sites, and anatomical drawings.

Sphon: "On the California coast we have seen *Opalia* but not *Epitonium* giving off a purple dye. Do all epitoniids produce it?" Robertson: "Not necessarily; though some *Epitonium* species are definitely known to do so, others may not."

STARCH-GEL ELECTROPHORESIS OF OYSTER SERUM. Aaron Rosenfield and Carl J. Sindermann, Bureau of Commercial Fisheries Biological Laboratory, Oxford, Maryland.

(Abstract)

Electrophoretic methods are becoming widely used in the study of plant and animal systematics. The methods appear particularly useful for detecting variations that are not readily distinguishable morphologically. In our laboratory, protein components in oyster serum and body fluid were compared in efforts to characterize populations, species, and genera within the family Ostreidae. Analyses of some multiple-enzyme systems (isozymes) in adult serum were made by vertical starch-gel electrophoresis. Dehydrogenases, peptidase, oxidase, phosphatases, and esterases were found in oyster serum; however, only those patterns that enabled differentiation among the taxa are discussed here. The oyster groups used were: *Ostrea edulis* (from Boothbay Harbor, Me.), *Ostrea lurida* (from Hood Canal, Wash.), *Crassostrea gigas* (from Hood Canal, Wash.), *Crassostrea virginica* (from Malpeque Bay, P.E.I., Canada; Chesapeake Bay, Md.; Chincoteague Bay, Va.; and Apalachicola Bay, Fla.).

Genera can be distinguished on the basis of patterns of general protein serum components as visualized by Amido-Schwartz or Ponceau S, as well as by patterns of such isozymes as alkaline phosphatase, esterase, amino peptidase, cytochrome oxidase, and glutamic dehydrogenase. Differences between *C. gigas* and *C. virginica* were apparent in zymograms of amino peptidase, esterase, and glutamic dehydrogenase. Differences between *O. edulis* and *O. lurida* were apparent in the isozyme patterns for glutamic dehydrogenase. The zymograms of glutamic dehydrogenase permitted separation of different populations of *C. virginica*. One component was found in the population of *C. virginica* from Apalachicola Bay, Florida, that was not present in the other populations. Also, slight differences were noted in populations from Malpeque Bay, Canada.

Although at present no functional significance is attached to the components visible in the zymogram patterns—particularly those of glutamic

dehydrogenases—the methods thus far have enabled us to differentiate among some genera, species, and geographic populations of oysters. Further experiments are in progress with other enzyme systems and species of shellfish in efforts to detect enzyme changes that accompany growth, development, and pathological conditions.

Charts were projected to illustrate method and results of testing the four species.

SOME RESULTS OF DEEP WATER TESTING. Ruth D. Turner, Museum of Comparative Zoology, Harvard University, Cambridge, Mass. U.S.A.

(Abstract)

The testing programs of the Naval Oceanographic Laboratory, Washington, D.C., and the U.S. Naval Civil Engineering Laboratory, Port Hueneme, California concerned with deep water biodeterioration have produced some very interesting material and data. This is the first time that test wood has been submerged in deep water and at some distance from shore.

The Fort Lauderdale tests consisted of wooden panels placed at 1, 2, and 3 miles from shore and at 50-foot intervals from the surface to the bottom which was 300 feet at 3 miles from shore. In this series species in the genera of Teredinidae which retain the young in the brood pouch (*Teredo* and *Lyrodus*) were found only in the inshore boards. Apparently the free-swimming stage of these species is too short for the larvae to be carried out to the 3 mile boards. *Bankia* were found in all boards. This appears contrary to the known fact that it is the larviparous species which have the widest distribution. The answer probably is that the adults are readily carried by floating wood or wooden ships and that the larvae they produce are held near the ship by the protective fouling cover for the duration of their short free-swimming life; consequently they can then bore into the parent wood and are not lost at sea. *Xylophaga*, a genus of wood boring Pholadidae, were common in the 300 foot board, 3 miles from shore. There were 10 in the bottom board 2 miles out, but only one in the bottom panel of the set 1 mile from shore. Nine specimens were in the 250 feet board at 3 miles, but none in any other boards. This is as would be expected, for most *Xylophaga* are found only in deep water.

Naval Oceanographic Laboratory tests in the Tongue of the Ocean, Bahama Islands, consisted of a series of panels suspended vertically, the first 50 feet below the surface, the second at 200 feet, the third 50 feet off the bottom, and the fourth was on the bottom at a depth of 5,762 feet. Those boards which were in contact with the bottom were nearly destroyed by two species of *Xylophaga*, both new. One was very teredo-like in its habits. It made tunnels over 6 inches long and lined the posterior two-thirds of the tubes with a thin layer of calcium. The periostracal border at the anterior end of the calcareous tube was attached to the posterior mantle margin, which means that the method by which the tube is produced is probably quite different than in the Teredinidae.

The submersible test units (STU's) designed by the Naval Civil Engineering Laboratory and set out are the largest ever used. Six units at two sites (STU-I, 1-4 and STU-II, 1-2) have been put out to date. Test site I near

San Miguel Island off Port Hueneme, California is at a depth of approximately 5,600 feet and site II at 2,500 feet. Each unit was loaded with over 1,000 sample materials to be tested, including untreated wood. There was a heavy infestation of wood and manila rope by at least three species of *Xylophaga*. None of these were the same as those taken from the Atlantic Coast test. It appears that species in this essentially deep water genus have quite restricted ranges.

Settlement of larvae was heaviest in protected areas, such as irregularities in the boards, or between the boards and the backing, and in those boards which were touching the bottom or were in the sediment-water interface. In such situations the number of entrance holes ranged from 15 to 125 per square inch. It was noticed in both the Atlantic and Pacific deep water tests (those in over 2,000 feet) that boards only 3 feet off the bottom were only slightly attacked and those 25 to 50 feet were completely free of borers. This is probably due to currents which prevent the settlement of the larvae. However, we know nothing of the development and behavior of the larvae or the length of the free swimming life. The fact that *Xylophaga* were found in boards 50 feet off the bottom in the shallower water of the Fort Lauderdale tests, suggests a difference in larval behavior in the various species.

According to Purchon (1941) *Xylophaga dorsalis* (Turton) appears to be a protandric hermaphrodite. He has demonstrated the presence of a visicula seminalis in which sperm from the male phase can be stored, thus allowing self-fertilization, a condition unknown in other bivalves and perhaps of great importance to these deep water animals living in what must be isolated populations. Anatomical studies on other species are needed.

The depth ranges of *Xylophaga* (Pholadidae) and the Terebinidae overlap as shown in the 300 foot, Fort Lauderdale boards, but no terebinids were found in the Tongue of the Ocean or STU boards, even though species in this family occur commonly on the adjacent shores. This probably means that terebinids which have been obtained from wood dredged at great depths had entered the wood before it sank.

Tests between the 300- and 2,000-foot levels, as well as additional tests in other areas and at greater depths, are needed to answer the problem of depth and geographical distribution of the many species involved. There are many unanswered problems concerning the biology and distribution of these interesting and economically important groups of borers, and it is hoped that these tests will be continued and extended to other areas.

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Dr. Turner's Kodachromes of submerged racks of test boards were of general as well as scientific interest; she concluded with a series of charted test results.

This paper completed the academic portion of opening day.

* * *

Following dinner the Executive Council met in annual session while the remainder of the delegates gathered to participate in what has come to be an annual feature, Shell Club Night.

Appropriately enough, this started out with lots of lots of shells, for in response to Dr. Parodiz's earlier request many had brought shells to give away or to swap—or just to show to fellow collectors.

Next, and with Mr. Bill Old of the New York Shell Club as the capable Master of Ceremonies, there was a showing of slides taken on occasion of the 1955 meeting at Wagner College. These candid shots are always enjoyable, especially after so long a time, and engendering as they do a mixture of hilarity and nostalgia as one recognizes himself minus the ravages of a decade.

Mr. Dan Steger of the St. Petersburg Shell Club showed slides taken while on a dredging trip with Jim Moore in the Gulf of Mexico, then others made on an expedition to pre-Castro Cuba.

Norman and Dorothy Jensen of the New York Shell Club entertained with a "production number"—slides with taped comment and musical background. "Position is everything in life," observed Mr. Jensen, then proceeded to prove his point with studies of models unaware of the camera.

Messrs. Jennewein, Porter, Wadsworth, and Withrow, all members of the North Carolina Shell Club, took the floor to relate their combined and successful efforts to convince the North Carolina Legislature that their state should adopt as the official shell *Phalium granulatum*, the Scotch Bonnet. Thus North Carolina becomes the first state to be represented by a shell, though we predict that others will soon emulate the example of the Tar Heel (oops, the Scotch Bonnet) state.

Mr. Karl Jacobson (New York Shell Club) read, with almost straight face, a report obtained from a "time machine." It covered activities of malacological interest in the year 2,365, indicating, among other things, that malacologists had not changed much in 400 years. Incidentally, a computer translation of the conversation of snails found living on the moon revealed a very advanced intellect.

Since the hour was growing late verbal reports of the activities of AMU member shell clubs were postponed until the following evening but there was another facet of shell club participation to be enjoyed for the entire four days to come. This was the display project furnished by the Conchological

Club of Southern California and the Pacific Shell Club. Arranged on a long table off the dormitory lounge were two maps, one of the California coastline, the other of Baja California; from molluscan habitats along the shores, colored yarns led to specimens of exquisite marine shells, each neatly packaged in plastic envelopes and bearing identification and collecting data.

This attractive display was seldom without one or many admiring viewers, and the announcement of Mr. Gale Sphon, official representative of the Pacific Division, that the two lots would be given as door prizes later in the meeting was received with delight.

* * *

Wednesday ushered in a perfect day, weatherwise, and a very full day with a heavy schedule of papers. It began with a muster on the steps of the administration building for the traditional group photograph, then a hasty trek back to the auditorium.

When his audience had reached their seats President Parodiz introduced the day's first paper, tenth of the meeting:

BACTERIAL EPIZOOTICS IN LARVAL AND JUVENILE PELECYPODS.

Haskell S. Tubiash, Bureau of Commercial Fisheries Biological Laboratory, Oxford, Maryland, and Paul E. Chanley, Virginia Institute of Marine Science, Wachapreague, Virginia.

(Abstract)

Advances in methods for induced spawning of bivalve mollusks and for algal food production have established the feasibility of artificial culture of commercially valuable or scientifically useful species of shellfish. However, commercial and experimental shellfish hatcheries frequently experience epizootics which cause high mortalities in larval and postlarval stocks of bivalve mollusks.

A group of gram-negative bacilli, isolated from dead and moribund larvae and juvenile *Mercenaria mercenaria* and *Crassostrea virginica*, were shown by *in vivo* challenge to duplicate spontaneously occurring infections in larvae of homologous and heterologous species, including *Aequipecten irradians*, *Ostrea edulis*, and *Teredo navalis*. Infection and death, with necrosis, proceeded rapidly, spreading from foci of swarming bacteria. "Swarming" was a pathognomonic sign of the disease. Histological examination confirmed the existence of a rapidly developing necrotic bacteremia, and the disease has been designated bacillary necrosis.

The pathogens are members of the order Pseudomonadales, probably of the genus *Aeromonas*. They have been grouped serologically into five antigenic types, and biochemically into four biotypes. They exhibited several unique characteristics when compared with established species and with similar-appearing marine bacteria isolated from normal fauna of Long Island Sound. *In vitro* tests demonstrated a characteristic antibiotic sensitivity pattern for each serotype. *In vivo* studies showed that chloramphenicol and streptomycin could be used for control of the infections.

Wheel: "Paul Chaney (mentioned as participating in this research project) was one of my Boys Club boys; I am so very proud of the work he is doing!"

THE NAIAD FAUNA OF THE GREEN RIVER AT MUNFORDVILLE,
KENTUCKY. David H. Stansbery, The Ohio State Museum and The
Ohio State University, Columbus, Ohio.

(Abstract)

The Green River from its headwaters through the upper third of its length combines a number of factors favorable to abundant naiad life. These factors include: soluble carbonate bedrocks, a firm sand and gravel substrate formed from sandstones and shales, and a relatively steep gradient providing both food-producing shallows and high oxygen levels. There is a fortunate lack of significant pollution and only one major impoundment. The favorable factors appear to reach an optimal combination in the vicinity of Munfordville, Kentucky, just before the Green becomes deep and sluggish during the rest of its meandering transit to the Ohio River.

The only previous Munfordville naiad records are those of eight species collected by Clench in 1925 (Ortmann, 1926). Six large collections made here since 1960 have increased the known naiad fauna to 43 species and 4 additional forms. Four of these species and one form are the first records for the entire Green River system.

Naiad Species Recorded from the Green River
at Munfordville, Kentucky

P—Previously Recorded (Ortmann, 1926)

R—Recently Collected (Stansbery, 1961-64)

*—New Green River Record

	Recorded
1. <i>Cumberlandia monodonta</i> (Say, 1829).	R*
2. <i>Fusconaia flava</i> (Raf., 1820).	R
3. <i>Fusconaia subrotunda</i> (Lea, 1831).	R
4. <i>Megaloniais gigantea</i> (Bar., 1823).	R
5. <i>Amblema plicata</i> (Say, 1817).	R
6. <i>Quadrula quadrula</i> (Raf., 1820).	R
7. <i>Quadrula pustulosa</i> (Lea, 1831).	R
8. <i>Quadrula metanevra</i> (Raf., 1820).	R
9. <i>Quadrula cylindrica</i> (Say, 1817).	R
10. <i>Tritogonia verrucosa</i> (Raf., 1820).	P R
11. <i>Cycloniais tuberculata</i> (Raf., 1820).	R
12. <i>Plethobasus cyphus</i> (Raf., 1820).	R
13. <i>Pleurobema clava</i> (Lam., 1819).	R
14. <i>Pleurobema cordatum</i> f. <i>cordatum</i> (Raf., 1820).	R
15. <i>Pleurobema cordatum</i> f. <i>coccineum</i> (Con., 1836).	R
16. <i>Pleurobema cordatum</i> f. <i>pyramidatum</i> (Lea, 1831).	R
17. <i>Pleurobema cordatum</i> f. ————	R*
18. <i>Elliptio crassidens</i> (Lam., 1819).	R
19. <i>Elliptio dilatatus</i> (Raf., 1820).	PR
20. <i>Lastena lata</i> (Raf., 1820).	R
21. <i>Lasmigona costata</i> (Raf., 1820).	R
22. <i>Alasmidonta calceolus</i> (Lea, 1828).	R

23. <i>Alasmidonta marginata</i> Say, 1818.	P R
24. <i>Strophitus undulatus</i> (Say, 1817).	P R
25. <i>Simpsoniconcha ambigua</i> (Say, 1825).	R*
26. <i>Ptychobranchnus fasciolaris</i> (Raf., 1820).	P R
28. <i>Obvaria subrotunda</i> (Raf., 1820).	R
29. <i>Obovaria retusa</i> (Lam., 1819).	R
30. <i>Actinonaias carinata</i> (Bar., 1823).	P R
31. <i>Truncilla truncata</i> Raf., 1820.	R
32. <i>Leptodea fragilis</i> (Raf., 1820).	R
33. <i>Leptodea leptodon</i> (Raf., 1820).	R*
34. <i>Proptera alata</i> (Say, 1817).	R
35. <i>Proptera laevisissima</i> (Lea, 1829).	R*
36. <i>Carunculina parva</i> (Bar., 1823).	R
37. <i>Ligumia recta</i> (Lam., 1819).	R
38. <i>Villosa fabalis</i> (Lea, 1831).	R
39. <i>Villosa ortmanni</i> (Walker, 1925).	P R
40. <i>Villosa lienosa</i> (Con., 1834).	R
41. <i>Lampsilis anodontoides</i> (Lea, 1831).	R
42. <i>Lampsilis radiata siliquoidea</i> (Bar., 1823).	R
43. <i>Lampsilis ovata</i> f. <i>ovata</i> (Say, 1817).	R
44. <i>Lampsilis ovata</i> f. <i>ventricosa</i> (Bar., 1823).	R
45. <i>Lampsilis fasciola</i> Raf., 1820.	R
46. <i>Dysnomia triquetra</i> (Raf., 1820).	R
47. <i>Dysnomia torulosa</i> (Raf., 1820).	R

During extensive collecting in the Ohio River system north of the Cumberland drainage over the past decade, we have not found any other site which has yielded as great a variety of naiad species as the Green River at Munfordville. The number of species and additional forms now recorded from the entire Green system is 64, and may increase with further research. This river today probably has the finest representative Ohioan naiad fauna yet in existence and this fauna may well reach its peak at Munfordville.

Dr. Stansbery oriented his audience, using a map of the Green River drainage, then alternated his Kodachrome slides of the mussels with reproductions of plates by Rafinesque, Conrad and Lea.

Morrison: "I am positive that those four forms of *Pleurobema cordatum* are distinct species; in my opinion Unios do not hybridize. If that was the case we'd find all conceivable intergrades between the forms since the sperm is in the water and so available to all females." Stansbery: "I found no intergrades between the forms of *cordatum* at Munfordville, although they have been reported by others from other streams." Morrison: "That fourth form of *Pleurobema cordatum* might be a new species of *Lexingtonia*; these genera are very closely related and stand next to each other phylogenetically." Stansbery: "Well—maybe. We have the soft parts back in the Museum and further study might settle that."

Ralph W. Dexter: "And I want to say to Mr. Wheel and the rest of you, Dave Stansbery was one of MY boys! We all have cause for satisfaction when we see good work being done by former pupils."

(Abstract)

The Stylommatophoran land snails are divided into four suborders—the Orthurethra, the Mesurethra, the Heterurethra, and the Sigmurethra, based on the structure and arrangement of the kidney and ureter. Pilsbry (1900) considers Orthurethra as most primitive from which Heterurethra and Sigmurethra evolved separately, while Baker (1955) holds the opinion that the most advanced Sigmurethra evolved from Heterurethran ancestors.

Cytological studies on Stylommatophora are more numerous than those on other molluscan orders and the existing information on their chromosomes have been reviewed extensively by Inaba (1961) and Burch (1965). This report, which fills in some of the gaps in our knowledge, is also a part of the continuing project to study the chromosomes of mollusks in our laboratory and deals with the chromosomes of 22 species of land snails collected in the U.S.A., Europe, Formosa, and Japan. The materials examined consisted of ovotestes fixed in Newcomer's fluid and stained by the acetoorcein squash method.

In the suborder Orthurethra, the haploid chromosome numbers already reported for five species range from 20–28. The present study on three species of *Achatinella* from Hawaii shows that they have haploid numbers of 20 and 21, while one species of *Pyramidula* of the family Pyramidulidae from Spain has $n = 26$. It is of interest to note that the low number of 20 occurs in the family Achatinellidae which is considered by Pilsbry to be more primitive and a group of great antiquity.

Thirteen species of Clausiliidae of the suborder Mesurethra have so far been studied cytologically. Inaba (1959) reported that $n = 24$ in two species from Japan and recently Thaler (1963) reported the same number in 7 species and 3 subspecies from Germany. Six species have been studied presently of which *Lacinaria biplicata* and *Clausilia bidentata* from Europe have $n = 24$. *Euphaedusa pseudosheridani* and *Hemiphaedusa similis* from Taiwan have $n = 28$ as also *Euphaedusa tau* from Japan. *Stereophaedusa japonica*, also from Japan, has a haploid number of 30. As pointed out by Burch, the occurrence of identical haploid numbers of 24 and 28 in two separate tribes, the Megalophaedusae and Phaedusae, raises some doubt about the current classification of this group.

Haploid numbers of 5, 6, 15, 17, 18, 19, 21, and 22 have so far been reported to occur in the morphologically aberrant Heterurethran succineids. Seven species from U.S.A. examined presently show haploid numbers of 18 and 19. The occurrence of very low numbers may be taken as to indicate the primitiveness of the group and perhaps as an indication that the group originated from the Opisthobranchs, as suggested by Burch and Heard (1962). In this connection, it is very interesting and significant to note that a haploid number of 7 has been reported to occur in the Ascoglossan *Bosellia mimetica* from Italy by Marcino and Sordi (1964). A thorough cytological—

¹ This investigation was supported (in part) by a research grant (GB-787) from the National Science Foundation, Washington, D.C.

anatomical study of the Heterurethra may well provide a key to a clearer understanding of chromosomal evolution in Mollusca in general and will necessarily add much to our understanding of the phylogeny and evolution within the group Heterurethra.

In the suborder Sigmurethra, 18 species of Helicidae so far studied have haploid chromosome numbers of 22–30 within which range falls the chromosome numbers of the three species of Helicids studied presently. Burch (1965) has stated already that this range seems to fit their generic groupings well, based on gross morphology. However, in the family Helicellidae, Watson's (1923) opinion that the genus *Helicella* is an advanced derivative of *Hygromia* via *Theba* is not fully supported by the cytological findings. *Hygromia* shows of course the lowest number of 21 but the present study shows that in *Theba pisana* from Spain, $n = 30$, a much higher number than 23–26 obtained in two species of *Helicella* so far studied.

In conclusion, the present study on the chromosomes of 22 species of land snails belonging to the four stylommatophoran suborders fits well the previous findings on these groups, and corroborates further the opinion of Burch (1965) that the suborder Heterurethra is aberrant and may perhaps be even more primitive than Orthurethra. As pointed out by him, the next decade will undoubtedly bring many advances in the cytology of snails and will either lend support to, or necessitate modification of, our present concepts of chromosomal evolution in mollusks.

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Projected tables illustrated this paper.

SEXUAL DIMORPHISM IN THE RADULA OF THE MURICID GENUS
NASSA. Virginia Orr Maes, Academy of Natural Sciences of Philadelphia.

(Abstract)

Radulae of the muricid genus *Nassa* are sexually dimorphic. Radulae of large males of the species *Nassa francolina* (Brug.) and *N. sarta* (Brug.) have broad, massive, almost monocuspid, rachidian teeth. The radulae of young males are also proportionately broader but otherwise resemble the females in having three well-developed cusps and an unthickened base of the rachidian.

A rather similar case of sexual dimorphism in another muricid genus, *Drupella*, has been reported previously by Arakawa (1958).

Accompanied by projected maps, charts, and photographs of the species under discussion.

BENTHIC ECOLOGY AND FAUNAL CHANGE IN THE ESTUARY OF THE PATUXENT RIVER. Kenneth J. Boss, Bureau of Commercial Fisheries Ichthyological Laboratory, U.S. Fish and Wildlife Service, Washington, D.C. and Arthur S. Merrill, Bureau of Commercial Fisheries Biological Laboratory, U.S. Fish and Wildlife Service, Oxford, Maryland.

(Abstract)

A series of benthic samples was taken at dredging stations at 10, 65, and 130 feet in June and December 1964, off Point Patience in the lower Patuxent River, near Solomons, Maryland. Samples of the fauna from each collection at each station were compared to assess the ecological effects of summer and winter conditions and of water depth.

The American oyster, *Crassostrea virginica* (Gmelin), was taken at all stations. Particular attention was paid to its occurrence at the unusual depth of 130 feet. The ecology of the deep-water population of oysters was compared with that of oyster populations of shallower stations. Growth indices were calculated for the oysters and for the other dominant bivalve, the ribbed mussel, *Brachidontes recurvus* (Rafinesque). The size frequency of the oysters was clearly divisible into two means (first-year and larger oysters), each of which showed growth at all three stations at the end of the 7-month period. The oysters taken from 65 and 130 feet showed less growth than the shallow-water population, and many had failed to spawn completely by December. The size frequency of the ribbed mussel could not suitably be divided into different means. The higher modes of the winter samples suggest that a slow development of the young mussels was continuous. The summer populations of both the oyster and the mussel were strongly diminished by December.

The deep-water winter stations were characterized by a dramatic increase in the numbers of the ascidean, *Mogula manhattensis* (DeKay), and the mud-snail, *Nassarius vibex* (Say). The red-finger sponge, *Microciona prolifera* (Ellis and Solander), appeared in dominant numbers at mid-depth. The population of the sea anemone, *Aiptasia erupaurantia* (Field) declined at the 130-foot depth as did its predator species, the wentle trap, *Epitonium rupicola* (Kurtz).

The changes in faunal composition suggest that epizoic organisms, such as *Mogula* and *Microciona*, adversely affect growth of the sedentary oysters and mussels whose shells provide a substrate.

Illustrated by a map of the collecting area.

Question: "What was the bottom temperature in December?"

Answer: "8 μ ° Centigrade."

RE-EXAMINATION OF E. S. MORSE'S STUDY ON CHANGES IN THE SHELLS OF *MYA ARENARIA*. Ralph W. Dexter, Department of Biological Sciences, Kent State University, Kent, Ohio.

(Abstract)

In 1879 E. S. Morse published a study based upon collections made in Japan in which he compared the length-width ratio of shell-heap clams (61.1%) and modern clams (62.5%). Upon his return to New England, he made similar studies reported in the literature 1881-1925. He found that shell-heap shells had a ratio of 62.78% compared with recent shells with a ratio of 61.67% north of Cape Cod. South of the Cape, the ratio was slightly less in each case. In 1882 John Robinson, in a study of shell-heaps, noticed considerable variation in ratio of the soft-shell clams. In spite of this, Morse continued issuing reports and concluded that differences in ratio resulted from climatic changes with more narrow shells produced in warm water, and he reported shells at the bottom of the shell mounds to have a higher index than those near the top.

As early as 1916, D. L. Belding noticed that mud-clams have a wider shell than the sand-clams. C. L. Newcomb (1935) demonstrated that mud retarded the growth of *Mya* shells. Swan (1952) found locality differences in shell ratios where the soil types were different, and experimental clams grown in mud attained a greater ratio than those grown in sand. The writer has often observed baskets of clams dug by commercial diggers with distinctive proportion according to the soil types from which they were dug. Some measured samples from Cape Ann, Massachusetts, based on the right valve following the practice of Morse, gave the following results. From Ipswich, mud 60.00%; sand 57.95%. From Annisquam River, mud 63.29%; sand 61.02%; sand 58.90%; sand 57.97%; sand 54.08%. From Essex, sandy-mud 61.49%; sand 60.35%.

The length-width ratio of *Mya* shells may have changed since prehistoric times, but this cannot be determined by comparison of shell measurements without knowing the substratum from which they were taken.

STUDYING LIVING TRIDACNIDAE IN THE MARSHALL ISLANDS.¹

Joseph Rosewater, U.S. National Museum, Washington, D.C.

(Abstract)

During February and March, 1963, four species of Tridacnidae were studied at Eniwetok Marine Biological Laboratory, Eniwetok Atoll, Marshall Islands, to obtain ecological, morphological, and behavioral data for a taxonomic monograph of the group. Adult *Tridacna gigas* and *Hippopus hippopus* lived unattached on sand in shallow lagoon waters (1-4 fathoms). Mantle colors and patterns were relatively stable: that of *T. gigas* had a dark yellow background with dark olive brown border and was liberally spotted with small greenish blue rings or oblong enclosures; that of *H. hippopus* was an irregularly mottled deep yellowish green and light grayish olive with white vermiculate markings. Adult *T. squamosa* and *T. maxima* were attached to reefs or coral heads in shallow water and the latter lived on the

¹ This work was supported by a travel grant from the U.S. Atomic Energy Commission.

outer reef, in interisland channels, as well as in the lagoon. The mantle of *T. squamosa* had a dark grayish purple background, with a secondary pattern of color markings consisting of various sized yellow or tan spots. Mantles of *T. maxima* varied, but the following backgrounds were noted: grayish yellow, light bluish green, blackish blue, grayish violet, and blackish purple. Secondary spots and streaks were noted, such as: light olive brown, grayish greenish yellow, brilliant green, bluish green, and brilliant blue (color names of Kelly and Judd, 1955). Observations indicated that Tridacnidae have a well-developed response to interruptions in light intensity such as may be caused by a fish passing over them. The response manifests itself by withdrawal of mantle tissues, closing of valves and emission of a forceful water jet from incurrent or excurrent siphons. Preliminary studies indicated that *T. gigas* may grow in length as much as 2 inches a year (see Rosewater, 1965; also Bonham, 1965).

Dr. Rosewater employed maps, a table of comparison characteristics and an extensive series of beautiful slides portraying *Tridacna* living in the lagoons of Eniwetok.

IS PULMONATA A MONOPHYLETIC TAXON?¹ Michael T. Ghiselin, Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts.

(Abstract)

Taxa are natural if they are based on propinquity of descent. The assumption that similarities are caused by common ancestry is largely valid, but any method must distinguish between similarity due to common ancestry and that due to convergence. Another possibility, parallelism, creates special problems, because closely related forms often undergo the same changes independently. Taxa reflecting parallel changes are still natural (and monophyletic by Simpson's definition) because they do reflect community of descent. Where parallelism has occurred, it is necessary to make a somewhat arbitrary decision as to where to delineate the ancestral and derived taxa. Assertions that Onchidiidae, Siphonariidae or *Succinea* are opisthobranchs because they lack some characters common in pulmonates, or have some common in opisthobranchs, often are purely verbal assertions, having nothing to do with relationships.

Convergence occasionally does occur. To discover what has happened, it is necessary to elaborate a valid system of phylogenetic arguments. Attempts to place organisms in a series of "primitive" and "advanced" forms fail because of mosaic and parallel evolution. A phylogenetic system (e.g., Ghiselin, *Malacologia*, in press) may overcome difficulties of parallelism by basing its arguments largely on divergences. It should treat each organ system as independent evidence, and correlate the separate inferences. The Euthyneura show an adaptive radiation in feeding mechanism and other properties of the gut; forms traditionally classified as pulmonates resemble each other in the type of jaw and gizzard, and do not fall into any particular group of opisthobranchs. The reproductive system shows its own patterns of diver-

¹ This investigation was supported (in part) by Public Health Service Training Grant GM-647 from the National Institute of General Medical Sciences, and by National Science Foundation Grant NSF-G19727.

gent modification. Pulmonates are distinct in: 1) gradual elaboration of an ejaculatory duct into a vas deferens; 2) pallial prostate; 3) the kind of ampulla; 4) loss of receptaculum seminis; 5) retention of albumen gland. They show no clear resemblances to any one opisthobranch lineage, much less two. The information given by Rigby (Proc. Zool. Soc. London. 1965) clearly show, if my arguments are valid, that *Succinea* is a pulmonate; the gut and genitalia are manifestly not anaspidian. Pulmonata is a natural assemblage, although the major clades diverged early, and there has been much parallelism.

THE HISTORY OF "MSX" ON DELAWARE BAY OYSTER GROUNDS, 1957-1965. H. H. Haskin, W. J. Canzonier, J. L. Myhre, Oyster Research Laboratory, N.J. Agricultural Experiment Station and Department of Zoology, Rutgers-The State University.

(Abstract)

Within 6 weeks in the spring of 1957 approximately 50% of the oysters on planted grounds in the New Jersey waters of Delaware Bay died. Heaviest kills, up to 85%, occurred in the vicinity of Egg Island Bar and decreased in intensity with distance from this center. No kills were observed on the seed beds, nor in the eastern section of the planting area. Seed oysters planted in the spring of 1958 began to die late that summer and by cold weather nonpredation losses exceeded 50%. Over the fall and winter of 1958-1959 kills extended to uppermost seed beds (Arnolds) and throughout the lower Bay. Kills were minimal on Tonger's Beds at mouths of principal freshwater streams and on Arnolds Bed. This was first indication that low salinities might limit the epizootic.

No industry plantings were made in 1959 or 1960 but experimental plantings were closely observed through 1959 and 1960. The epizootic kill continued unabated in 1959 but declined in summer and fall of 1960, encouraging industry planting in spring of 1961. Most of these oysters were marketed the same fall with only moderate losses to disease. Similar successes in 1962 and again in 1964 indicate that the epizootic has eased so the Delaware Bay industry can operate on a short planting cycle.

To determine in detail the patterns of epizootic kill in susceptible oyster stocks, to seek resistant strains of oysters and to study the causative agent, its mode of transmission, its method of kill, etc., experimental stocks of a variety of oysters have been held in trays on Cape Shore tidal flats under close observation since June 1958. The pattern of kill of susceptible stock depends on time of introduction. Spring and early summer imports have their first heavy kill in late summer and early fall with a second smaller peak in late winter. Mortality rate remains well above background in the second summer with a tendency toward higher kill in late July and August. Late summer imports will have occasional deaths that fall but first peak kill will be in late winter. Mortalities will be generally high the following summer commencing in June. Fall imports become infected but may not have first kill until the following June when a sharp peak occurs. Susceptible spring import losses will be 65-85% by November. In 1961, 1962 and 1963 the patterns were drastically changed. Spring imports did not begin to die until

the second summer and then at rates one-fourth to one-third those of the earlier years. In 1964 the earlier pattern reappeared. There is also increasing evidence for the development of resistant strains of oysters from both oyster ground and tray stock studies.

The causative agent called "MSX" (multinucleate-sphere X) was discovered by Dr. L. A. Stauber in our laboratories in oysters dredged in the spring of 1958 from grounds on which heavy kill had occurred. Its presence has been closely correlated with oyster kills on our Bay grounds and in our trays. Immediately preceding peak kills in susceptible stocks 70–75% of the oysters may be infected. Up to 100% of the gapers (recently dead oysters) collected during epizootic kills have had "MSX." Successive samplings and histological study of imported susceptible stocks indicate that infections first occur in gills, palps, and suprabranchial chambers, frequently with extensive sloughing of the epithelium. General invasion of the circulatory system follows and "MSX" plasmodia may then be found throughout the oyster. Localized infections are frequently found in old survivors of epizootic kills. To date transmission of infection has not occurred under controlled conditions and the life cycle of "MSX" is unknown. The plasmodial stages closely resemble stages of various members of the genus *Haplosporidium*, strongly suggesting that "MSX" may belong in this genus.

Projected maps, charts, graphs and microscopic studies of infected oysters accompanied this paper.

STUDIES OF CAPTIVE *PRUNUM APICINUM* MENKE. Dorothy Raeihle,
New York Shell Club.

(Abstract)

In November of 1963 *Prunum apicinum* Menke were collected in the Florida Keys: eight adult specimens from Tom's Harbor were all white except for just a blush of color at the nuclear whorl; a dozen smaller specimens taken at Pigeon Key were yellowish and apparently speckled. These smaller specimens were juveniles that soon matured into colorful adults with three to four reddish spots along the apertural edge of the shell and with streaks and spots of red on the animal. The "speckles" disappeared as the shell thickened with maturity—it had been the body of the animal showing through the translucent juvenile shell that had given it the speckled appearance.

All the *Prunum* were kept in one aquarium with aerated sea water and fed chiefly on our local blue mussel, *Mytilus edulis*. In March of 1964 they began to deposit egg cases—transparent oval "blisters" 2½ mm long and 1½ to 2 mm wide including a flat rim by which they were attached to the side-wall of the aquarium. Each capsule contained a pale yellow egg of about ¼ mm in diameter; about one in 200 capsules held two eggs.

After the 14th day of incubation a bit of shell could be seen forming over the posterior of the embryo, by the 20th day it was a fragile cap. Incubation varied from 29 to 35 days, with the majority hatching the fully formed snails on the 30th or 31st day. Newly hatched *Prunum* ranged from 1 mm to 1½ mm in length, with 65% of them 1½ mm or more. The one twin case observed was an exception, not hatching its two smaller than average snails (1 mm and 1.2 mm) until the 57th day.

Prunum hatched in the spring matured in approximately 5 months, depositing egg cases in early autumn. By November the aquaria held about 125 specimens that had been raised in captivity. They were quite variable in their coloration, but could be roughly divided into four categories: 1) White shell, white animal; 2) Shell with red spots, animal with color markings—these two categories as in the field collected specimens—3) White shell, animal with color markings; 4) Shell with red spots, animal white.

From these 125 specimens two small lots were selected: 1) All white specimens; 2) specimens with strong reddish spots on both shell and animal. These lots were kept separate, each in an aquarium with shallow, unaerated sea water. Progeny of these two lots, hatching in November and December, took at least 7 months to mature—and their coloration was again variable.

The presentation was illustrated with color slides by George Raeihle, showing *Prunum apicinum* Menke in various stages of development, from egg to adult, and a growth series of shells from 1½ mm to 11 mm.

Although no questions followed this beautifully illustrated paper it was perhaps the most discussed feature of the entire meeting, and later in the program was to be cited as an example of the valuable work being done by the amateur.

THE NAIAD FAUNA OF LITTLE DARBY CREEK IN CENTRAL OHIO.

Carol B. Stein, The Ohio State Museum and The Ohio State University, Columbus, Ohio.

(Abstract)

Little Darby Creek, a tributary of Big Darby Creek of the Scioto River system, drains 176 square miles of glacial till plain in four west-central Ohio counties. It was studied as part of a larger survey now under way on the naiad fauna of the Scioto River drainage. A large dam soon to be constructed on Big Darby Creek will impound several miles of Little Darby and profoundly alter the habitat of the freshwater mussels which now inhabit this stream. Twenty sites were collected in the Little Darby drainage, and 22 species of naiads were found. These were:

Fusconaia f. flava (Raf., 1820).

Amblesma plicata costata (Raf., 1820).

Quadrula cylindrica (Say, 1817).

Pleurobema clava (Lam., 1819).

Pleurobema cordatum coccineum (Con., 1836).

Elliptio dilatatus (Raf., 1820).

Lasmigona costata (Raf., 1820).

Lasmigona compressa (Lea, 1829).

Anodonta grandis Say, 1829.

Anodonta imbecillis Say, 1829.

Alasmidonta calceolus (Lea, 1829).

Alasmidonta marginata Say, 1818.

Strophitus undulatus (Say, 1817).

Anodontoides ferussacianus (Lea, 1834).

Ptychobranthus fasciolaris (Raf., 1820).

Carunculina parva (Bar., 1823).

Villosa iris (Lea, 1829).

Lampsilis fasciola Raf., 1820.

Lampsilis radiata siliquoidea (Bar., 1823).

Lampsilis ovata ventricosa (Bar., 1823).

Dysnomia triquetra (Raf., 1820).

Dysnomia torulosa rangiana (Lea, 1839).

All mussels collected alive in 1964 and 1965 from two stations below Mechanicsburg and which had 17 or more annular rings exhibited a peculiar interruption and later resumption of shell growth. Young specimens from these stations are perfectly normal. Specimens from all other stations are normal. Such a growth interruption might have been caused by some catastrophe, such as a brief but severe period of pollution in this section of stream. A local newspaper reported a heavy fish kill, presumably caused by accidental discharge of liquid fertilizer into the stream near Mechanicsburg, on May 26, 1956. It is possible that this fish-killing pollutant affected the mantle of the surviving mussels in such a way that this peculiar growth form resulted.

A map was projected, then collecting sites, collectors and the unionid fauna of the area were pictured, the latter clearly showing the abnormality described by the speaker.

Morrison: "It has been my experience that more than one annular ring may be formed on a mussel shell in one year, so seventeen years need not have elapsed since the molluscan catastrophe recorded here." Merrill: "In marine mollusks one sometimes finds two annular rings formed the same year, one at the time of release of gametes, the other at the end of the so-called growing season."

PATHOLOGIC RESPONSES OF THE OYSTER, *CRASSOSTREA VIRGINICA* (GMELIN), TO INFECTION BY THE PROTISTAN PARASITE, MSX. C. Austin Farley, Bureau of Commercial Fisheries Biological Laboratory, Oxford, Maryland.

(Abstract)

A multinucleate, haplosporidian-like parasite, designated MSX, has occurred in the tissues of oysters collected from Delaware and Chesapeake Bays during recent periods of heavy mortality. Critical examination was made of live oysters and histological sections of oyster tissues from random samples collected from Marumsco Bar, Pocomoke Sound, Md., to study the pathologic relationship between host and parasite. Infections have been classified into five pathologic categories related to the sequence of infection.

(1) *Initial infections*, found most commonly in July, August, and early September, are characterized by localized infection in the gills of oysters. Intracellular plasmodia are seen first in the columnar epithelial cells; a clear area, thought to be lysis, usually surrounds them. Plasmodia then migrate to the basement membrane where plasmotomy occurs, and thence into the connective tissue and blood sinuses of the gill. Host response, recognized by a massive concentration of small (8μ) lymphocyte-like cells with large (5μ) nuclei, is evident in affected areas.

(2) *Intermediate infection* follows initial infection or occurs as the result of relapse of chronic infection. It is characterized by localized lesions, with accompanying host response in the gill, gonad, diverticulae, and connective tissue adjacent to gut and mantle epithelia. Recessive shell growth and shell-pustule formation may occur in this phase. *Intermediate infections* resulting from *initial infections* can be differentiated from *relapsed intermediate infections* by the occurrence of lesions in the gill, gonad, and epithelium of the gut; *relapses* are usually characterized by localized lesions in the diverticulae and connective tissue adjacent to gut and mantle epithelium. *Relapses* were most common in June. *Intermediate infections*, which follow closely and overlap initial infections, were most frequent in July, August, and September.

(3) *Advanced infection* was most prevalent from September through December. It is characterized by massive infection and host response throughout the oyster, resorption of gametes, shrinkage of gonad tubules, and a marked tendency toward recessive shell growth.

(4) *Terminal infections* exhibit massive invasion of tissues but the intensity of infection may vary, depending on the length of time the infection is carried before death occurs. Host response is usually light or absent and pycnosis of host and parasite cells is often apparent. *Terminal infections* are evident before and during mortality periods in the fall and winter. Recessive shell growth is usually present.

(5) *Recovery* is thought to occur in some oysters and is recognized by the deposition of yellow-brown, conchiolin-covered shell pustules, which is preceded by the formation of localized fibrocytic lesions in the tissue near and in mantle epithelium. Moribund MSX can be found in both lesions and shell pustules, but rarely elsewhere in the tissue. This syndrome occurs most commonly in the summer and fall. Another phase which occurs in the winter and spring is characterized by a marked decrease of infection intensity in *advanced infections*; recognizable MSX occurs most commonly near and in epithelia. Many oysters collected during this time, which exhibit no diagnosable infection, have recessive growth, and it is thought that these represent chronic infections which relapse into the active intermediate infections as described above.

(Illustrated by pathological studies of infected oysters.) Dobo: "May this disease be communicated to human consumers?" Farley: "No, it is restricted to mollusks."

BIOLOGICAL SIGNIFICANCE OF AERIAL TEMPERATURE SURVEYS.

Richard B. Stone, Sandy Hook Marine Laboratory, Highlands, N.J.

(Abstract)

Aircraft, used for aerial sea surface temperature surveys, provide a platform for synoptic observations of large areas of ocean in the continental shelf and slope region. It is possible through visual and photographic observation to plot the occurrence of marine surface flora and fauna such as seaweed, plankton blooms, fish schools, and marine mammals and relate the distributional patterns to sea surface temperatures collected on the same flight by remote sensing. Aerial biological observations in the

spring of 1964 and 1965 have provided distributional data valuable to the study of migratory patterns of certain pelagic fish, e.g., mackerel and brown sharks.

Surface and bottom drifters released during the aerial survey provide information on circulation patterns of shelf waters prerequisite to understanding the distribution of ichthyoplankton.

ECOLOGY OF *MELANOIDES TUBERCULATA* (MÜLLER) AND *TAREBIA GRANIFERA* (LAMARCK) IN SOUTH TEXAS. Harold D. Murray and Leon J. Wopschall, Trinity University, San Antonio, Texas.

(Abstract)

Established populations of *Melanoides* (= *Thiara*) *tuberculata* (Müller) and *Tarebia* (= *Thiara*) *granifera* (Lamarck) were reported in South Texas at the 1964 AMU meetings (Annual Report, American Malacological Union, 1964). Inasmuch as both species are introduced from the Orient and inasmuch as both species serve as intermediate hosts for human parasites in the Orient, these snails stimulate medical and ecological interest. At present, the snails seem to be of no medical significance in this country.

Both species occur in San Antonio, Bexar County, Texas; and, since last year, populations of both species have been observed in New Braunfels, Comal County, Texas. Presently no records occur for San Marcos, Texas; however, they are expected.

Information from local aquarium dealers leads us to believe that *T. granifera* was introduced into the area around 1935. We have no information concerning the time of introduction of *M. tuberculata*.

The study area is an 18- by 33-foot pool in an effluent of the San Antonio Zoo. The water of this effluent is of artesian origin. Six sampling areas were set up in the pool—one in each of four corners and one in the middle of each side. The sampling box was $5\frac{1}{4}$ by $4\frac{15}{16}$ inches, and living snails over 5 mm shell length were counted and measured. Six samples were taken in November, 1964; six in February, 1965; six in May, 1965; and six in August, 1965.

The data show that the 18- by 33-foot pool maintains over 2,850,000 living snails which averages to 4,798 living snails per square foot or 33 snails per square inch. These population sizes have been maintained for at least 3 years.

M. tuberculata is the predominate species in the pool and outnumbers *T. granifera* by a ratio of three to one. Three years ago the ratio was reversed. The greatest percent of the populations of both species of snails is from 5–15 mm. *M. tuberculata* maintains a stable population as to the percent of individuals of any one size and as to total number of snails over a nine month period. *T. granifera* maintains a stable population as to total numbers but the percent of individuals of any one size fluctuates considerably over a nine month period. Thus far, over 15,000 snails have been counted and measured.

The data indicate 1) that the population of *M. tuberculata* is relatively stable, 2) that the population of *T. granifera* is relatively unstable, 3) that *M. tuberculata* may be displacing *T. granifera*, and 4) that the population of both species of snails is unusually large.

Future studies will now center upon the carbon and nitrogen cycles necessary to support this unusually large population.

A map of pool drainage, graphs, and a part of the huge snail population illustrated Dr. Murray's paper.

* * *

At this point the afternoon session was adjourned, the scheduled business meeting being postponed because of lack of time.

The picnic supper outside the dining room of Mastick Hall was served smögasbord style. Appetites appeased, delegates gathered once again in the auditorium for the evening program which began with the annual business meeting.

The annual report of the AMU secretary was heard:

Over the previous fiscal year 99 new members were enrolled, 7 died, 14 resigned, and 152 were dropped for delinquent dues. On January 1, 1965 there were 731 members in good standing, divided into the following categories:

Five hundred nine hold regular (or individual) membership, 194 are registered under the joint or family plan, 27 live outside the eastern hemisphere hence are corresponding members. There are 5 honorary life members, 1 life president, and 16 hold paid life membership. 134 AMU members are likewise members of the Pacific Division. 18 charter members remain on the roster, and 35 shell clubs are dues-paying members.

The 1964 annual bulletin went to 102 pages and cost \$1.69 per copy to print and mail.

"How to Collect Shells" was out of print as of May 1, 1965. Of the four printings since 1955, 4,500 copies were sold for a net profit of \$991.04; this figure includes \$156.80 received when the type was scrapped. A revision is being compiled by Dr. Tucker Abbott and Editor Karl Jacobson.

The secretary did not avail herself of the suggestion made from the floor at the 1964 meeting that she be empowered to purchase a new addressing machine; since but two mailings per year are made from her office it would not justify the labor and cost of stencils. However, it is planned to employ typed duplicating labels for future mailings.

Requests for information on all levels continue to come in. As in the past, most are answered by a packet of mimeographed material. There has been notable increase in inquiries from foreign sources; when the writer expresses a desire to exchange shells or correspondence, his letter is answered then forwarded to one or another of our member shell clubs.

The secretary wishes to express personal regret at the resignation of Jean Cate as AMU treasurer; our relationship has been most pleasant and the voluminous correspondence a pleasure rather than a necessary task. Membership and Council alike owe to Mrs. Cate a debt of gratitude for having put AMU finances on a businesslike and profitable footing.

It was moved from the floor, seconded, and carried that this report be accepted as read.

Treasurer Jean Cate was ill and unable to be present but had prepared for the Executive Council a brief report of the financial standing of the AMU at midyear; this report was read:

**TREASURER'S SEMIANNUAL REPORT TO THE EXECUTIVE COUNCIL
JUNE 30, 1965**

Since this is an unofficial report, merely for the purpose of acquainting the Council members with the current status of the A.M.U. Treasury, it will be as brief as possible. The Annual Report for 1964, circulated last February, will remain the official accounting for the printed record.

During the first half of 1965, our total income was \$2,343.17; the expenses total \$1,629.43.

The balances on June 30 are as follows:

Savings account	\$2,312.98	
Life Membership Fund	1,030.88	
Checking account	865.21	
Secretary's petty cash	40.04	
Treasurer's petty cash	11.68	
Balance on hand	-----	\$4,200.79

No inventory of stamps was made at this time.

Respectfully submitted,
Jean M. Cate
Treasurer

All delinquent members were sent special notices in mid-May; 95 remained delinquent on June 30, three of whom are Council members. Probably more than half the total number of delinquents will become dropouts, the rest will straggle in later in the year.

All bills received by June 30 have been paid.

Since this report was unofficial, no action was taken as to its acceptance. (See page 42 for a complete financial report.)

The secretary was asked to report on action taken by the Executive Council which had met in annual session on the previous evening; among other routine business the following was accomplished:

The invitation of the North Carolina Shell Club to hold the 1966 annual AMU meeting in that state was accepted.

Accelerated action was begun to complete the incorporation of the AMU on a tax-exempt basis.

President Parodiz announced the appointment of Drs. William K. Emerson and Henry van der Schalie to represent the AMU at the August meeting of the European Malacological Congress.

Vice President Ralph W. Dexter was likewise appointed to be the AMU representative at the 1965 meeting of the AAAS at Berkeley, California.

Pacific Division Gale Sphon presented amendments to the By-laws of that organization which had been drafted at the June meeting; these were unanimously ratified by the AMU Executive Council. (See page 60-61.)

The annual report of Treasurer Cate (mailed earlier to each

Council Member) was reviewed; it bore the resignation of Mrs. Cate from her duties as AMU treasurer, same to take effect on January 1, 1966.

The report of the Nominating Committee was heard and the Council voted to go on record as giving unanimous approval to the slate as read.

The Council gave the new treasurer carte blanche in the matter of renting such business machines as are necessary in the performance of his or her duties, as well as authorization to employ such professional aid as may be required.

The Council meeting had closed with a unanimous expression of gratitude to Mrs. Cate for her competent and tireless efforts on behalf of the AMU.

In the absence of the Nominating Committee chairman the secretary read the slate of officers nominated by William K. Emerson, Aurèle La-Rocque, and R. Tucker Abbott:

President, Ralph W. Dexter

Vice President, Leo G. Hertlein

2nd Vice President, Alan J. Kohn

Secretary, Margaret C. Teskey

Treasurer, Mae Dean Richart

Publications Editor, Morris Karl Jacobson

Councillors-at-Large, Mary Kline, Joseph Rosewater, Robert W. Talmadge, Gordon Usticke

A motion was made from the floor that nominations be closed and that the secretary be instructed to cast a unanimous ballot for the slate as read.

The motion was seconded and carried and, there being no further business, the meeting was declared adjourned.

* * *

Miss Marian Schroth of the New York Shell Club was introduced and she in turn called the roll of the AMU affiliated shell clubs. More than half of the 35 clubs had representatives present, and for each a spokesman made a brief report of club activities for the past year. These included establishing scholarships, compiling area checklists of shells, taking an annual shell census, arranging public exhibits of shells, publishing collecting and conservation tips, conducting shell appreciation classes for the blind, holding shell auctions for the benefit of club treasuries or other worthy causes, and publishing monthly reports and newsletters.

Gone are the days when ladies of the conchology club gathered of an afternoon to sip tea as they listened to a "learned" paper read by one of the group. Today's clubs are combining field, laboratory, and paper work in a fashion to earn the approval and gratitude of the professional malacologist to whose work they make valuable contribution. One of the greatest accomplishments of the AMU is that of bringing together these people, workers all in the cause of science.

The first of two scheduled features, again by self-styled amateurs but on a most professional level, was introduced. PINK SANDS OF ELEUTHERA was a series of slides portraying the joys of living and collecting on that lovely island. The photography was the work of Mr. Norman Jensen of the New York Shell Club, the cleverly taped narration against a musical background was that of his wife, Dorothy. The whole was a joy to hear and to see, and when it was announced that immediately following the meeting the Jensens were off again to Eleuthera there was a mass admonition to take more pictures.

CAMERA CLOSE-UPS OF LIVE MOLLUSKS by George Raeihle, President of the New York Shell Club might have been anticlimatic but wasn't, owing to an abrupt change of scene and subject matter. Away from the tropical beach came the viewer, up to and seemingly into the tank with one, another and another colorful mollusk.

Mr. Raeihle explained that close-up photographs on color slides project to show the mollusk as if viewed through a low-power microscope; he presented such species from the New York area as *Gemma gemma*, *Lunatia heros*, *Busycon carica*, *Haminoea solitaria*, and *Mitrella lunata*, all performing for the camera by feeding, leaving trails on wet sand or, in the case of *Epitonium rupicola*, expressing annoyance by emitting a purple stain when disturbed.

Florida species such as *Bailya intricata* was photographed in the natural habitat, then close-up in the tank with newly hatched youngsters fresh from the egg case and at one, two, and four months of age. *Acanthopleura granulata* showed his color pattern of haemofluid in bands as he moved, then his open mouth with a fine view of the radula. The animal of *Natica canrena* was most colorful in orange and brown—"The tiger in our tank," observed Mr. Raeihle; *Astraea americana* maneuvered its bulk from one stone to another, feeling and testing with tentacles before shifting. Finally, a juvenile specimen of the shell-less mollusk *Onchidella floridana* which had at first appeared to be a tiny *Chiton* but identified when examined under a 30× microscope.

The lights came on and the evening concluded on a hilarious note as Mr. James Wadsworth delivered another of his roving reporter skits on the conduct of his fellow delegates.

* * *

Thursday's sessions were held in the auditorium at the Staten Island Institute of Arts and Sciences. Although scheduled to begin at 9:30 A.M. there was an hour's delay caused by the fact that the driver of one of the buses transporting delegates from the college first became lost, then managed to bottle his cumbersome vehicle into the dead end of a long street too narrow to permit turning.

Mr. Joseph F. Burke, Vice President, Board of Trustees, Staten Island Institute of Arts and Sciences was waiting to voice his welcome to his guests; President Parodiz replied that many of those present recalled the Museum's hospitality on occasion of the former meeting and were happy to return.

He then introduced the first paper; because of the unavoidable delay it was necessary to curtail the discussion of all papers for the rest of the day.

MAINTENANCE OF OYSTER TISSUE *IN VITRO*. Aaron Rosenfield, Bureau of Commercial Fisheries Biological Laboratory, Oxford, Maryland.

(Abstract)

Tissue culture has had recent wide application in studies of diseases in vertebrates and would have comparable utility in studies of certain aspects of disease in economic molluscs such as the American oyster. An oyster tissue culture system could be used for (1) the detection of viruses, (2) a study of cytopathologic effects of micropathogens, and (3) growth of cryptic life-cycle stages of microparasites suspected of causing mass mortalities of oysters. Some progress has been made in the development of such a system.

Vertebrate tissue culture media, with adjusted salt concentrations, were screened for their ability to support the maintenance, and possibly the growth, of oyster tissues and cells. Explants of oyster venticle (approx. 1 to 2 mm²) were introduced into Leighton tubes and Maximow slides with and without plasma clots and incubated at 20°C in appropriate media. Media containing 10% oyster serum plus 100 units penicillin and 100 µg streptomycin/ml were changed weekly for the first 4 weeks and monthly thereafter. In experiments with plasma clots, several cell types were seen to migrate from the explant within 1 to 2 hours after planting. Within 2 weeks strand-like aggregations of cells had emanated from the periphery of the explants that had become attached to the glass. Pulsations of heart explants were observed up to 10½ months after planting in modified Eagle HeLa, L.Y., and Puck's N16 media. Cell division was not observed. In experiments without plasma clots, modified MME (Minimal Medium, Eagle), 858, Eagle L, and Scherer's media, in addition to the media already mentioned, supported maintenance of pulsations up to 5 months, although explants did not adhere to the glass. No strand-like "outgrowths" were observed, however, in these maintenance cultures. Efforts to induce cell division in explant heart cultures by the addition of the water-soluble fraction of oyster embryo extracts and with phytohemagglutinin were not successful.

The knowledge that it is possible to maintain oyster tissue *in vitro* for prolonged periods has permitted us to undertake other tissue culture studies. Maintenance cultures as described can be used in studies of oyster diseases.

(Accompanied by slides of Dr. Rosenfield's microscopic studies.)

CUCULLAEA, PAST AND PRESENT. Katherine V. W. Palmer, Paleontological Research Institution, Ithaca, New York.

(Abstract)

The genus *Cucullaea* Lamarck, 1801, *Cucullaea labiata* (Lightfoot), type species by subsequent designation, Children, 1823, is represented by species from the Jurassic to the present. Abundant in the past, its survival is conspicuous with one species in the Indo-Pacific region. It is a prionodont (saw-like teeth) bivalve, family Cucullaeidae, not Arcidae, Glycymerididae, or

Parallellodontidae where the genus has at times been placed. Shell subquadrate, transverse teeth with fine teeth in the middle of the hinge. Living forms are thin, porcellaneous, sculpture of fine radiating ribs, which do not have a byssal gap. The fossil species frequently are heavy, often ponderous. Nicol (1950) and Habe (1964) are the most recent writers to review the living forms. Nicol (1954) compiled a careful nomenclatural review. *Arca* or *Cucullaea concamera*, *C. cucullus*, *C. cucullata*, *C. auriculifera*, *C. concamerata*, and *C. plicata* are synonyms of *Cucullaea labiata* (Lightfoot), 1786. *C. vaga*, *C. petita*, and *C. granulosa* are regarded as subspecies or forms of *C. labiata*.

Cucullaea with its probable 22 subgenera are known: Jurassic, North America, Europe, India, Somaliland, Arabia, and New Zealand; Cretaceous, worldwide, climax in North America and Europe; extinct in Paleocene in California and Paris and in the lower Eocene in the Mississippi embayment, eastern United States to New Jersey; common Oligocene and lower Miocene in New Zealand; survived until Pliocene in eastern Australia; Recent, one species, from Red Sea, Persian Gulf, India, East Indies, Japan, China, to New South Wales, and Queensland. The typical form occurs in the Red Sea and to India. Shell, color, and ornamentation vary with the environment. Fossils commonly were found in the Cretaceous, Paleocene, and Eocene of the United States of America. Many of the former rich localities have disappeared. Old localities of the Paleocene and Eocene of Virginia and Maryland were: Virginia—Woodstock, Potomac Creek, Paspotansa Creek, 2 miles below Potomac Creek, in King George County, Aquia Creek in Stafford County; Maryland—Popes Creek, Liverpool, 1 mile southeast Mason Springs, Clifton Creek, Glymont, in Charles County, 1 mile south of Thrift, 3 miles west of Leeland, Fort Washington, in Prince Georges County, Hardesty, Sheckel's Farm, in Ann Arundel County, Rolph's Landing in Queen Anne County.

Particular importance to collectors in the Atlantic Coastal area is the discovery of new localities and rediscovery of old areas. The localities now known in the Chesapeake area where specimens of the genus may be obtained are Belvidere Beach (south of mouth of Aquia Creek) and Fairview Beach (about a mile south of Aquia Creek, along Potomac River), Virginia, and possibly Popes Creek, Maryland. The status of the Maryland-Virginia Eocene species and their stratigraphic placement is still indefinite.

Besides specimen shells, Dr. Palmer employed slides illustrating the dentate differences of *Cucullaea* and *Arca*, distribution maps, a geological chart and color slides made of New Zealand.

ELECTROPHORETIC STUDIES OF SOME DIPLOID AND POLYPLOID BULININAE.¹ Gary L. Pace and Gene Lindsay, University of Michigan, Ann Arbor, Michigan.

(Abstract)

Davis and Lindsay (1964) introduced the technique of disc electrophoresis of foot muscle proteins as a means of demonstrating the degree of

¹ This investigation was sponsored (in part) by the Commission on Parasitic Diseases of the Armed Forces Epidemiological Board and was also supported (in part) by a research grant (2 T1 AI 41-07) from the National Institute of Allergy and Infectious Diseases, United States Public Health Service.

genetic divergence between molluscan groups. This paper is a progress report of studies designed to study the applicability of this technique to the medically important planorbid subfamily Bulininae.

Fifteen populations of bulinids have been studied electrophoretically. *Indoplanorbis exustis* as well as representatives from three of the four species "groups" of *Bulinus* (Mandahl-Barth, 1958; 1960) were included; the "Forskali group" was not represented due to lack of sufficient material. These populations were:

Diploid Populations ($n = 18$)

Indoplanorbis exustis (Deshayes). India

Bulinus

Africanus group

B. globosus (Morelet). Rhodesia

B. globosus (Morelet). S. Africa

B. nasutus (Martens). Kenya

Tropicus group

B. tropicus (Krauss). S. Rhodesia

B. tropicus (Krauss). Kenya

B. guernei (Dautzenberg). Senegal

B. "?sericinus" (Jickeli). Ethiopia

Polyploid Populations ($n = 36, 72$)

Truncatus group

B. truncatus (Audouin). Egypt ($n = 36$)

B. truncatus (Audouin). Corsica ($n = 36$)

B. coulboisi (Bourguignat). Tanzania ($n = 36$)

B. truncatus rohlfsi (Clessin). Ghana ($n = 36$)

B. "?sericinus" (Jickeli). West Aden ($n = 36$)

B. "?sericinus" (Jickeli). Ethiopia ($n = 72$)

It should be noted that the bulinid populations represent samples from extreme western, eastern, and southern Africa as well as Corsica and the Arabian Peninsula. Potential variation at several levels were thus tested. Two populations of one taxon in each species group were tested for interpopulation variation. An attempt to determine the degree of subspecific variation was made by testing two subspecies in the Truncatus group. Interspecific variation was tested between at least two species in each group. Intergroup variation and variation between diploid and polyploid taxa was measured by comparing representative protein patterns from each group. Note that three populations identified as *B. "?sericinus"* belong to two different groups according to chromosome number as described by Burch (1964) and Natarajan, Burch, and Gismann (1965).

Whenever measuring variation of a particular character or set of characters within a group, it is wise to obtain some idea of the relative differences in those characters in taxa outside the particular group of interest. To this end specimens of *Biomphalaria glabrata* (Say) from Puerto Rico and *Helisoma trivolvis* (Say) from Michigan were tested electrophoretically. These two species represent the two subfamilies Biomphalariinae and Helisomatinae, respectively.

When the protein patterns of all of these taxa were compared, strikingly

little variation was found. The variation observed between populations of one species of *Bulinus* were often as great as that between the three sub-families represented in the study. This observation in planorbids varies markedly from that reported by Davis and Lindsay (1964) for lymnaeids and hydrobiids. These workers found that in these two families, "distinct species have distinct patterns, not patterns where many fractions appear homologous. . . ."

Both of these sets of results were obtained in the same laboratory, using similar techniques. If both sets of observations are accepted, then it must be concluded that the genetic determination of proteins has diverged to quite different degrees in the three families. Thus, genetic divergence as displayed by divergence in protein composition is essentially absent in the Planorbidae relative to the Lymnaeidae and the Hydrobiidae.

The fact that little variation occurs between the protein patterns of diploid and polyploid taxa is not necessarily surprising since there seems to be very little such variation between any of the planorbid taxa studied.

Thus at this stage of experimentation, the applicability of disc electrophoresis techniques to the solving of taxonomic and phylogenetic problems in the Planorbidae, much less the Bulininae, appears very unlikely.

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(Illustrated by a distribution map of Africa, graphs, and shells.)

NOTES ON THE GENERA OF HIPPONICIDAE. J. P. E. Morrison, U.S. National Museum, Washington, D.C.

(Abstract)

The search for the identity of a single Hipponicid snail species from St. John of the U.S. Virgin Islands, led to questions about generic characters of this family and a couple of other similar forms. It appears that each generic group possesses a different shape of embryonic shell.

Antisabia foliacea (Quoy and Gaimard) has a prominently spirally ridged nuclear whorl of neritoid shape. This group includes *A. antiquatus* (Linnaeus) from the Atlantic, *A. panamensis* (Broderip) from the East Pacific, and *A. foliacea* (Quoy and Gaimard) from the Indo-Pacific.

Sabia conica (Schumacher) is commensal on shells of other mollusks on Indo-Pacific shores. It and other (deeper water) species have very small annicoloid embryonic shells set at right angles to the long axis of the adult shell.

Typical *Hipponix* is fossil; its true nuclear whorl characteristics have not been proven yet.

Malluvium has a widely flaring neritoid embryonic shell with an almost plane spire at right angles to the long axis of the adult shell. *Malluvium australis* (Quoy and Gaimard) from Australia, New Caledonia and Japan is radiately ridged. *M. lissus* (E. A. Smith) from the Indo-Pacific, and *M. benthophila* (Dall) from the Western Atlantic are smoother species that live in deeper waters.

Pilosabia has a neritoid nuclear whorl with an epidermally fringed adult shell. *Pilosabia trigona* (Gmelin) is known only from the Pacific. The names *pilosa* Deshayes and *barbata* Sowerby are synonyms of *trigona*.

Cochlear cernuus (Gmelin) has a widely flaring rounded neritoid embryonic shell that is transversely costate above. The name *subrufa* Lamarck is a synonym of *C. cernuus* (Gmelin) of the West Indies. The St. John species of *Cochlear* is *C. costellatus* (Carpenter) which is known from the Virgin Islands, the Abrolhos Islands (off Brazil), and the Cape Verde Islands and St. Helena of the Eastern Atlantic. The only other members of this particular group are *C. imbricatus* Gould (Hawaii) and *C. grayanus* (Menke) from the Eastern Pacific.

The genus *Capulus* (family Capulidae) has rounded planorboid nuclear whorls, almost plane, in line with the axis of this smoothish shell.

The American *Hyalorisia* of Dall has fewer nuclear whorls of helicoid shape, almost in line with the axis of the low and smooth shell.

Krebsia also has gradually increasing whorl size from the apex onward. The shell of *K. militaris* is prominently radiately ridged throughout.

Thyca (family Thycidae; parasitic on starfishes) is known only from the Pacific Ocean. It has needle-shaped porcelaneous white nuclear whorls. The male shell is minute (dwarfed) sheltered under the spirally ridged female shell.

(Color slides of both adult and embryonic shells were shown by Dr. Morrison to illustrate his ideas of these generic characters.)

MARSHLAND IS NOT WASTELAND; a film presentation of the Staten Island Institute of Arts and Sciences.

This manifestation of the shocking manner in which the so-called wastelands in and about New York City are being despoiled by man was a vivid reminder that unless measures are taken to curtail wholesale pollution and unsupervised disposal of refuse, the marshes which already are hard put to support their native bird, mammal, and amphibian life will become wastelands in truth.

* * *

A break for lunch followed this feature. A delicious meal was served cafeteria style in the Museum auditorium which was cleared for the purpose, then reassembled in time for the afternoon sessions.

In the interim delegates inspected with great interest the exhibits furnished by the New York Shell Club and arranged in the foyer of the Museum. These consisted of wall displays of local and exotic shells from members' collections and of several terrariums and aquariums; the former contained live land shells ranging from Florida *Liguus* and *Cerion* to *Cepaea nemoralis* and *Triodopsis fosteri* from a Rockaway Beach backyard while the aquaria had been stocked with such local marine fauna as *Busycon carica* which spent the day busily feeding on the other molluscan denizens of the tank.

This latter exhibit received rapt attention from the "inlanders" and as one club member remarked to another, "When I heard somebody ask, 'what's that black thing sticking out of the shell?' I knew all our hard work had been worthwhile. Imagine never having seen the siphon of a live *Busycon* before!"

* * *

The afternoon's papers:

THE MARQUIS DE FOLIN AND HIS WORK ON THE CAECIDAE.

Donald R. Moore, Institute of Marine Science, University of Miami, Miami, Florida.

(Abstract)

Alexandre Guillaume Leopold, the Marquis de Folin (1817-1896), was trained for service with the French Navy. After several years service on various naval ships, he moved ashore and served as Port Captain (1857-1868) first at Saint-Nazaire, then at Pauillac. From 1868 until his retirement in 1880, he was Port Captain at Bayonne. After retirement, he settled at Biarritz, where he remained for the rest of his life.

Although his life was centered on the sea, he does not seem to have been greatly interested in marine life until 1861. At this time, Alphonse Milne-Edwards made a report to the French Academy of Science on the discovery of marine organisms attached to a broken submarine cable brought up from the depths of the Mediterranean. This discovery was of great interest at the time because the great English marine biologist, Edward Forbes, had theorized that life in the sea did not exist below 300 fathoms. The discovery of life in the great depths so stimulated Folin that he conceived the idea of making a special study of the sea floor.

Folin became interested in minute mollusca when he examined a shipment of pearl oystershell from the Bay of Panama. Many minute species were found in cracks and holes in the shells. Encouraged by French scientists, he published a paper in 1867 entitled *Les Meleagrinoles: Espèces Nouvelles*. In the same year, he published a paper on the Caecidae, and began to publish his own journal, *Les Fonds de la Mer*. This journal was published for 20 years, and most of Folin's work on the Caecidae was published here. He described about 160 species and varieties altogether.

Folin obtained his material by advertising and by distributing pamphlets asking for bottom material. More than 2,000 samples were sent in from

all over the globe. The Caecidae collected by the "Challenger" were also turned over to Folin for study.

A review of the life and work of Folin was published in 1956 by B. S. Kisch. A catalog of Folin's types appeared 3 years later. Kisch had high praise for the drawings published by Folin, but many are seen to be unreliable when compared with the types. In addition, many of the types are in very poor condition, or are immature specimens. These are usually synonyms of previously published species. Perhaps 16 out of the 70 odd species described from the western Atlantic are valid.

Although Folin was overenthusiastic in describing species, we must remember that this was a common fault of the age. However, Folin carefully preserved his type collection in glass covered slides, and, when he could no longer work with it, he gave this collection to the Muséum National d'Histoire Naturelle in Paris. We may find fault with his descriptions and illustrations, but at least his collection is available for study and revision.

LATE CENOZOIC EVOLUTION OF THE *AEQUIPECTEN GIBBUS* STOCK. Thomas R. Waller, Department of Geology, Columbia University.

(Abstract)

The evolution of a common group of Pectinidae, consisting of the living bay and calico scallops and their fossil ancestors, has been reconstructed by means of a detailed study of samples of both living and fossil populations. Paleontologically, the study has been limited to the Upper Miocene (Choctawhatchee) through Recent of the Atlantic and Gulf coastal plains of the United States, and, biologically, it has been limited to living material from the western Atlantic, Caribbean, Gulf of Mexico, and eastern Pacific. The time span investigated is about ten million years, according to presently accepted stratigraphic correlation and to the latest absolute-time scale, edited by Harland, Smith, and Wilcock (1964) and published by the Geological Society of London.

Morphological study has involved the measurement of many shell characters, including the outline of the disk, auricles, and outer ligament and the dimensions and positional relationships of impressions of the adductor muscle, gill suspensories, pallial line, and resilium. In addition, plicae and auricular costae were counted, and the height and internal width of plicae were measured. These data have been subjected to univariate and bivariate analyses using automated techniques. Growth (size) trends and intervalve relationships have been studied and compared by means of machine-plotted bivariate scatter diagrams and regression lines (reduced major axes), and the morphological separation of living and fossil species has been evaluated by means of comparisons of regression-line clusters.

The resulting phylogeny shows that the lineage of the eastern Pacific, which is today represented by a single species, *Aequipecten circularis* (Sowerby) 1835, branched from an Atlantic-Gulf of Mexico stock at an early date, most likely during the late Miocene (pre-Choctawhatchee). In terms of both its morphology and its generalized habitat (bays, sounds, and the upper continental shelf), the living Pacific species is considered primitive.

The Atlantic-Gulf stock in the late Miocene consisted primarily of a single highly variable species, *Aequipecten comparilis* (Tuomey and Holmes) 1857, which, like *A. circularis*, was probably generalized with respect to habitat. By early Pliocene time (Caloosahatchee-Waccamaw), this variable species had begun to divide, and two species have been distinguished, one of which became adapted to a bay-sound environment [*Aequipecten antemplicostatus* (Mansfield) 1936] and the other of which became adapted to the open waters of the upper continental shelf [*Aequipecten charlotensis* subsp. (Mansfield) 1936]. The bay-scallop lineage changed considerably between the early Pliocene and early Pleistocene, and specimens from deposits (Belle Glade, Florida) considered here to be early Pleistocene in age are essentially modern in aspect and can be identified with *Aequipecten irradians concentricus* (Say) 1822. The subspecies *A. irradians amplicostatus* (Dall) 1898, *A. i. irradians* (Lamarck) 1819, and *A. i. sablensis* Clarke 1965 probably originated within the Pleistocene. Although the calico-scallop lineage [*A. gibbus* (Linnaeus) 1758] has changed less between the early Pliocene and early Pleistocene than the bay-scallop lineage, it gave rise to another species, *Aequipecten nucleus* (Born) 1780, in the Pleistocene. The latter species has entered what appears to be a bay-scallop type of environment and is morphologically convergent on the bay scallop, *A. irradians*.

Aequipecten eboreus (Conrad) 1833, a common species of the Miocene and Pliocene, is considered to be only distantly related to the *A. gibbus* stock and may even represent an entirely different stock. In certain characters *A. gibbus* of the Pleistocene and Recent is convergent upon *A. eboreus* and may have entered the environment formerly inhabited by that extinct species.

An evolutionary chart illustrated this paper.

SOUTH AMERICAN MALACOLOGY. Dee Dundee, Louisiana State University in New Orleans, Louisiana.

This was the report of a hurried air trip made by the Dundees over the 1964 Christmas holidays. Slides illustrated their visits to most of the major science museums and some of the South American colleges. In concluding her remarks Dr. Dundee observed that research in South America, while desperately needed, is doubly hampered by the difficulty of travel and the lack of funds. "It's a BIG country and opportunity for work and study is unlimited!"

ENZYME HISTOCHEMISTRY OF THE AMERICAN OYSTER, *CRASSOSTREA VIRGINICA* GMELIN. Albert F. Eble, Trenton Jr. College, Trenton, New Jersey.

(Abstract)

Three enzymes, alkaline phosphatase, nonspecific esterase and malic dehydrogenase, were surveyed for distribution and relative concentration in the American oyster. Animals were sampled throughout the year to note seasonal effects and stored in the refrigerator (4°C) to observe changes due to hibernation. Alkaline phosphatase levels are quite intense in the spring

and fall digestive gland; the apical portions of the stomach and intestinal epithelia also have substantial portions of this enzyme during these periods. Levels of esterase and malic dehydrogenase follow a similar pattern. All enzyme levels are much depressed in the winter, non-feeding condition. In the summer, the mature ovary and testes show a heavy concentration of malic dehydrogenase; alkaline phosphatase is restricted to the oogonia and spermatogonia; esterase activity is lacking in the gonad. The winter resting gonad shows slight malic dehydrogenase and alkaline phosphatase activities. In general, high levels of malic dehydrogenase are found where mitochondria abound, i.e., heart muscle, ciliated cells, actively synthesizing cells; alkaline phosphatase and esterase appear to be concentrated in secretory cells, i.e., tubules and ducts of digestive gland, mucous cells of mantle and gills and kidney cells.

(Illustrated with projected microscopic slides.)

FRESHWATER AND LAND SNAILS OF ST. LUCIA, THE WEST INDIES. Emile A. Malek, Tulane University, New Orleans.

(Abstract)

A survey was made of the freshwater and land snails of St. Lucia, one of the Windward islands of the Lesser Antilles. The systematics, ecology, and distribution of these mollusks are reported and the relationship to the fauna of other Antillean islands discussed.

As to the freshwater snails they were collected from rivers, ravines, river and ravine embankments, wide portions of ravines in the form of pools, floodplains or swamps off rivers, drainage ditches and ponds. The following species are found on the island: *Physa cubensis* (Pfeiffer), *Ferrissia beau*i (Bourguignat), *Australorbis glabratus* (Say), *Drepanotrema depressissimum* (Moricand), *Drepanotrema lucidum* (Pfeiffer), *Littoridina tenuis* (von Martins), *Neritina reclinata* (Say), *Pomacea flagellata* (Say).

The land snails collected in this survey seem to be widely distributed on the island. Large colonies of *Subulina octona*, *Bulimulus exilis*, *Pleurodonte bainbridgei* (Pfeiffer) are found in the most populated town, Castries, the capital. They also inhabit forested areas, coastal plains, and foothills. *Succinea hyalina* (Shuttleworth) was also collected near freshwater habitats.

The three species of planorbids inhabiting the island show relationship with the South American fauna. Together with the physid and ancylid species, they also occur on certain other Antillean islands.

The Lymnaeid snail *Lymnaea* (*Fossaria*) *cubensis* occurring in Cuba, Puerto Rico, and a few other islands was not collected during this survey in St. Lucia. The presence, however, of the liver fluke of cattle *Fasciola hepatica* on the island indicates that this or *Lymnaea* (*Pseudosuccinea*) *columella* inhabit the island but probably were not abundant enough at the time of the survey to be obtained.

The camaeneid land snails are highly characteristic of this and other islands of the West Indies. *Subulina octona*, however, has become of too worldwide distribution to be of importance in tracing faunistic relationships.

Dr. Malek employed color slides to illustrate his paper; his was the final presentation of an unusually crowded schedule and as with those preceding, time did not permit questions nor observation.

Buses back to the dormitories, barely time to repair the ravages of the day and to don party clothes, then buses again down into the village and to the Staaten Restaurant, justly hailed as Staten Island's finest.

The cocktail hour preceding dinner was tendered by the New York Shell Club and, coming as it did at the close of an unusually hectic day, was most welcome.

Tables in the banquet room were decked with shells and flowers while at each place was a fine paired specimen of *Aequipecten irradians*—the area's most colorful shell.

Following the meal of delicious prime ribs, Miss Marian Schroth arose to explain that drawing for the two lots of California and Mexican shells so kindly donated by our western colleagues, was in order. Name badges had been collected following the final afternoon session, and from these the names of Mr. Dan Steger of Tampa, Florida and Mr. Paul Jennewein of Wrightsville Beach, North Carolina were drawn. Needless to say, both recipients were delighted at receiving some very fine shells.

On behalf of the AMU, President Parodiz extended thanks to the New York Shell Club for the hospitality the delegates had enjoyed.

Mr. George Raeihle, president of the club, replied for his fellow members that it had been a great privilege to have entertained the AMU, that everyone had pitched in to help; he then invited all members of the New York Shell Club to stand.

President Parodiz in turn called on his AMU colleagues for a rising vote of thanks for a job well done, a request to which his listeners responded with alacrity.

Then as his last official act President Parodiz introduced President-Elect Ralph W. Dexter, presenting to him the gavel and thus ending his own tenure in office.

Dr. Dexter made a brief speech of acceptance, invited everyone to attend the 1966 meeting, then went on to call on as many of the AMU past presidents as time would allow.

WILLIAM J. CLENCH reported upon his study of the land and freshwater mollusks found in Russell Cave, Bridgeport, Alabama (National Monument). Carbon 14 dating indicated that the lowest layer dated from 7000 B.C. to 5000 B.C., from the bedrock of the cave.

Most of the freshwater snails were of the Family Pleuroceridae and most of these had their spires broken. The Indians probably cooked them, then broke the spires so that the soft parts could be sucked out through the aperture.

Numerous specimens of freshwater clams of many species were there also, most of them broken; they may have been cooked then broken after the shells were discarded. Most of these came from the Tennessee River, some six or seven miles to the southeast of Russell Cave. The few land snails were probably only migrants into the cave. In all cases, the same species which occurred there in 7000 B.C. occur there today; this would indicate that whatever climatic changes took place over this 9000 year span, they weren't sufficient to modify the molluscan fauna.

R. TUCKER ABBOTT: "We all have heard that Bill Clench is soon to retire as Curator of Mollusks at the Museum of Comparative Zoology. Bill has held that job for 40 years and many of today's malacologists got their training as his pupil—Harald Rehder, Henry Russell, Yosh Kondo, Don McMichael, Ruth Turner, Joe Rosewater, myself, to name some of them.

"We all owe Bill a great debt and I would like to take this opportunity to eulogize a friend who has contributed to malacology in many lasting ways."

KARL JACOBSON: "I too want to pay tribute to our friend Bill Clench; these meetings wouldn't be complete without him. And while I have the floor I want to say thanks to Tony D'Attilio for the grand job he did on our programs this year. We couldn't have put this meeting together without Tony and Rose."

KATHERINE PALMER: "We (Paleontological Research Institute) are publishing the illustrations of the mollusks described in Carpenter's Mazatlan Catalogue. It's a job that's about one hundred years overdue; there are 60 plates to be copied."

JOHN Q. BURCH: "I agree that this is long overdue, and will be a good job once it's finished. It should serve to vindicate P. P. Carpenter."

JOSEPH P. E. MORRISON: "I want to express my appreciation of the work these amateurs are doing; it gets more important all the time. They say they work for love and I guess they do, but it surely pays off. Mrs. Ræihle's paper was on a true professional level, and her observations on *Marginella* life history are MOST important! I never saw the eggs of *Marginella* before."

WILLIAM K. EMERSON: "You're all invited to visit us at the American Museum of Natural History, at your convenience. We inherited a mess there, but have it largely resolved. And we've about doubled the number of lots in the collection. We are lucky in that we get a lot of local help."

At this point the banquet was officially terminated since it had been a long evening following a long and exhausting day. It was late (late for the AMU) when the laden buses made their final trip of the day. Another half-hour, and quiet reigned at Wagner College.

* * *

Friday morning was another story as 56 departed for the field trip, a 10-mile bus ride to Sandy Hook, New Jersey.

Arrival at the State Park coincided with low tide and shellers immediately headed for ocean and bay. At noon, over box lunches, notes were compared:

The ocean beach had yielded live *Lunatia heros*, *Urosalpinx cinerea*, *Crepidula plana*, and *Nassarius obsoletus*, but only *Mytilus edulis* in quantity. Beach specimens ranged from good to fragments and included *Aequipecten irradians*, *Anadara transversa*, *Anomia simplex*, *Astarte castanea*, *Crasostrea virginica*, *Ensis directus*, *Laevicardium mortoni*, *Petricola pholadiformis* in pairs, *Spisula solidissima*, *Tellina agilis*, *Venericardia borealis*, *Busycon* sp., *Crepidula fornicata*, *Eupleura caudata*, *Nassarius trivittatus*, and *Polinices duplicatus*.

The shore of Sandy Hook Bay was like a scene from the film seen the day before—"Marshland is not Wasteland." Intermingled with other forms of

marine life were flourishing colonies of *Brachidontes demissus plicatulus*, *Gemma gemma*, *Mya arenaria*, *Hydrobia minuta*, *Littorina littorea*, *Littorina saxatilis*, *Melampus bidentatus*, and *Nassarius obsoletus*. At least single specimens of living *Lacuna vincta* and *Urosalpinx cinerea* were noted, as well as valves of *Mytilus edulis* and a fragment of *Cyrtopleura crispata*; however, observation of living species was so interesting that compilation of beach specimens was neglected.

After lunch many visited U.S. Fish and Wildlife's Sandy Hook Marine Laboratory at the invitation of the director, Dr. Lionel Walford. Members of the laboratory staff took groups on tour and described work in progress. Here experiments were being conducted to determine the effects of temperature and light cycles on behavioral and biological activities of various species of fish. In one particularly large room filled with aquaria, researchers were studying the effects of commonly used pesticides on marine fauna, as these chemicals are steadily being leached into our waters. Locally collected specimens, from *Nassarius obsoletus* through minnows and pipefish to food fishes, were under observation—and none were immune.

Meanwhile, another group went on a nature walk led by Richard C. Cole, Park Naturalist and Chief Ranger at the Sandy Hook Park Ranger Station. Mr. Cole told of Sandy Hook, how the peninsula was formed by ocean currents and pointed out the many types of vegetation that hold the drifting sand. Some of the trees in the holly forest are over 250 years old; the abundant cactus is native to the area. There are few shells to be seen because the tide was quite high on one hand, and on the other, poison ivy deterred a search for land snails; however, along the path were several dead shells of *Tridopsis albolabris* and a previously flooded area held a drift of dead and bleached *Melampus bidentatus*.

A few found time to visit the Park Ranger Station where the ranger on duty was pleased to have two more species added to his list of local mollusks.

It was a full and enjoyable day, completed when at 5:00 P.M. the buses made their final return to Wagner College.

By dusk the annual exodus was nearly over; the few who stayed overnight enjoyed a late supper at the Staaten Restaurant but it was a subdued occasion—something seemed to be missing. By noon on Saturday these too had departed and the thirty-first annual meeting of the American Malacological Union was a matter of record, and of memory.

MARGARET C. TESKEY, *Secretary*

AMERICAN MALACOLOGICAL UNION, INC.

(Report of the field trip is a compilation of notes made by Marian Schroth and Dorothy Raeihle with assistance by Richard Welsh on collected species.)

AMERICAN MALACOLOGICAL UNION, INC.

TREASURER'S ANNUAL REPORT FOR 1964

Balance on hand January 1, 1964:

Life Membership Fund	\$ 970.88	
Savings account balance	1,493.00	
Checking account balance	541.00	
Cash and stamps, Secretary	7.64	
Cash and stamps, Treasurer	7.55	\$3,020.07

Income:

Membership dues collected	2,007.75	
Sales, HOW TO COLLECT SHELLS	322.80	
Sales, back issues AMU Bulletin	61.00	
Pacific Div. assessments collected	73.00	
Pacific Div. advance repaid	25.00	
Miscellaneous overpayments on dues	3.00	
Miscellaneous bank credits	3.00	
Interest on savings account	140.64	\$2,636.19
Balance forward		\$5,656.26

Expenses:

Printing and mailing of annual report	1,105.93	
Convention expenses, New Orleans	34.92	
Pacific Div. assessments forwarded	73.00	
Refunds of overpayments on dues	3.00	
Editor's expenses	25.00	
Secretary's expenses to New Orleans	242.38	
Pacific Div. Secretary to Asilomar	48.00	
Addressograph machine repair	15.00	
New addressograph stencils	76.12	
Miscellaneous postage and express	209.98	
Miscellaneous office supplies	96.09	
Telephone toll charges	6.98	
Printing, mimeographing & photocopy	125.88	
Expenses of incorporation	49.08	
Bank charges, bad checks, etc.	15.50	\$2,126.86
Balance forward		\$3,529.40

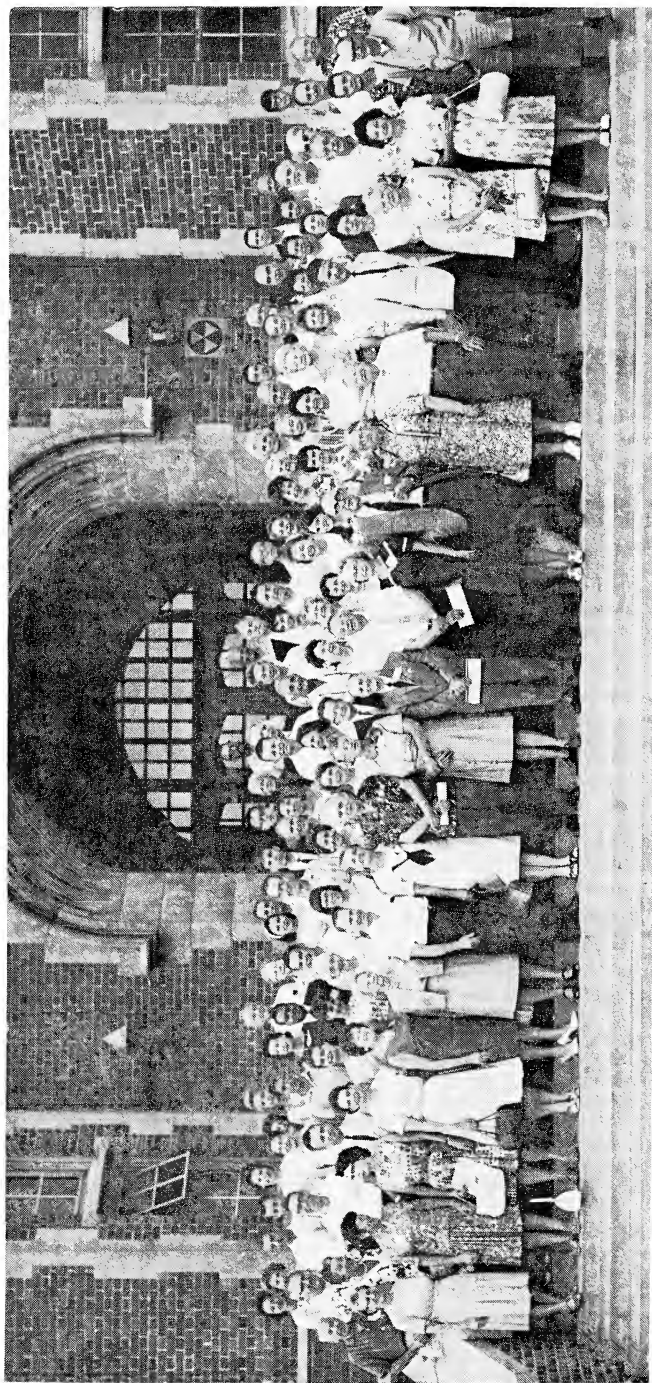
Balance on hand December 31, 1964:

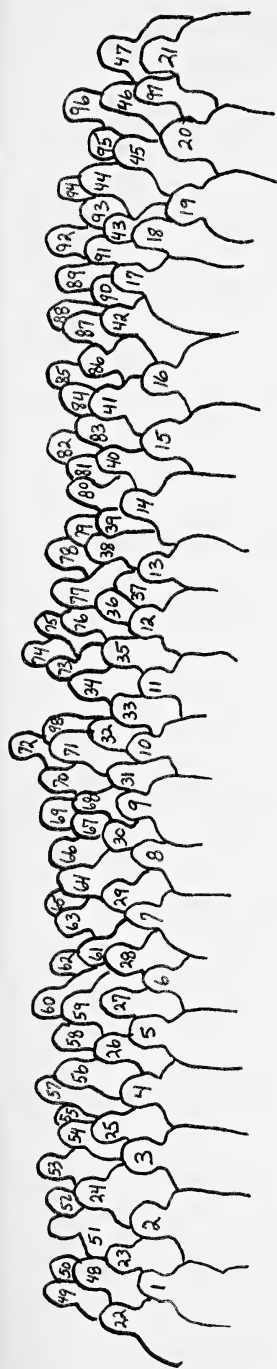
Life Membership Fund	970.88	
Savings account balance	2,223.51	
Checking account balance	223.49	
Cash and stamps, Secretary	54.45	
Cash and stamps, Treasurer	57.07	\$3,529.40 \$3,529.40

Jean M. Cate, Treasurer
American Malacological Union, Inc.

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Dr. R. Tucker Abbott, Academy of Natural Sciences, Philadelphia
Miss Letha Allen, Baltimore, Maryland
Dr. and Mrs. H. B. Baker, Havertown, Pennsylvania
Mrs. Alice Barlow, Tenaflly, New Jersey
Mrs. Ruth M. Berry, Durham, North Carolina
Dr. and Mrs. Alger P. Blaine, Springfield, Massachusetts
Dr. Kenneth Boss, U.S. National Museum, Washington, D.C.
Mrs. Ward Brown, Lake Worth, Florida
Mr. John Q. Burch, Los Angeles, California
Dr. Alberto Carcelles, Museo Argentino de Ciencia Natural, Córdoba, Argentina
Dr. William J. Clench, Museum of Comparative Zoology, Harvard University
Mr. and Mrs. William Cole, Rutgers University, New Brunswick, New Jersey
Mrs. Juliette Compitello, Brooklyn, New York
Mrs. Ruth A. Craine, Norwich, New York
Mrs. Charles Darwin, Cookeville, Tennessee
Mr. and Mrs. Anthony D'Attilio, Valley Stream, New York
Dr. and Mrs. Ralph W. Dexter, Kent State University, Kent, Ohio
Mr. and Mrs. Louis E. Dietrich, Pittsburgh, Pennsylvania
Mrs. Ruth Dixon, Durham, North Carolina
Mrs. Gabriel Dobo, Wrightsville Beach, North Carolina
Dr. Dolores Dundee, Louisiana State University in New Orleans, Louisiana
Dr. Albert Eble, Trenton Junior College, New Jersey
Dr. William K. Emerson, American Museum of Natural History, New York
Mr. Austin Farley, Bureau of Commercial Fisheries, Oxford, Maryland
Mr. David Franz, Rutgers University, New Brunswick, New Jersey
Dr. Dorothea Franzen, Illinois Wesleyan University, Bloomington, Illinois
Dr. Michael Ghiselin, Museum of Comparative Zoology, Harvard University
Mrs. Laura Gilbert, San Antonio, Texas
Mrs. Leona Grantier, Willowdale, Ontario, Canada
Dr. and Mrs. William J. Hamilton, Ithaca, New York
Mr. and Mrs. LeRoy Heist, Alexandria, Virginia
Mrs. Anne Hunter, Hackensack, New Jersey
Mr. Morris K. Jacobson, Rockaway Beach, New York
Mr. and Mrs. Paul Jennewein, Wrightsville Beach, North Carolina
Mr. and Mrs. Norman Jensen, Astoria, New York
Veronica Parker Johns, New York City
Mr. Richard I. Johnson, Chestnut Hill, Massachusetts
Mrs. Kay Lawrence, Falmouth, Massachusetts
Dr. and Mrs. John R. Lewis, Downers Grove, Illinois
Mrs. Olive Lewis, College Park, Maryland
Mrs. Grace MacBride, North Wales, Pennsylvania
Mrs. Virginia Orr Maes, Academy of Natural Sciences, Philadelphia
Dr. Emile A. Malek, Tulane University School of Medicine, New Orleans
Mr. and Mrs. John McCallum, Wexford, Pennsylvania
Dr. Arthur S. Merrill, Bureau of Commercial Fisheries, Oxford, Maryland
Mr. and Mrs. Harvey Meyer, Knoxville, Tennessee
Dr. and Mrs. Donald R. Moore, Marine Laboratory, University of Miami, Florida





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Dr. Joseph P. E. Morrison, U.S. National Museum, Washington, D.C.
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 Mrs. Elayne Musnick, New York City
 Dr. Raja Gopala Natarajan, University of Michigan, Ann Arbor, Michigan
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 Dr. E. Laurence and Dr. Katherine V. W. Palmer, Paleontological Research Institution, Ithaca, New York
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 Mr. and Mrs. Richard Petit, Ocean Drive Beach, South Carolina
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THE AMERICAN MALACOLOGICAL UNION, PACIFIC DIVISION EIGHTEENTH ANNUAL MEETING

The eighteenth annual meeting of the Pacific Division of the American Malacological Union was held at California Western University, San Diego, California, June 24-27, 1965.

Registration began Thursday morning at 9:00 A.M. at Cal Western Lodge under the direction of Fay Wolfson, Treasurer, and Barbara Good, Secretary, assisted by Virginia Hanselman. Members of the Hospitality Committee also gave able assistance.

The meeting was officially opened at 2:00 P.M. by Chairman Edwin C. Allison, who welcomed to San Diego the 108 registered members and guests.

Several announcements were made regarding transportation arrangements, meals, and the banquet to be held that evening at Fisherman's Wharf Grotto. Chairman Allison then introduced Dr. Raymond Gilmore of the Biology Department of California Western University. Dr. Gilmore stated that this was the first meeting of its type to be held at the Lodge, which is located in Point Loma directly overlooking the Pacific Ocean. He indicated that he hoped that all would enjoy their stay and that they might be able to do some exploring in the untouched area at the beach in front of the Lodge.

The first paper was then presented:

**TOWARD GREATER ORDER: PROCEDURE IN REVISING A MOL-
LUSCAN FAMILY.** Eugene V. Coan, Dept. of Biological Sciences, Stanford
University, Stanford, California.

(Abstract)

Revisions of molluscan families are being prepared by various workers for the *Treatise on Invertebrate Paleontology*. The editors of the *Treatise* have outlined the basic procedures for these revisions. This procedure involves the searching out of all generic names proposed or subsequently placed in the family, the checking of original descriptions of these names, the verification of type designations, the arrangement of the genus-level units in a meaningful fashion, and the diagnosis of each genus and subgenus. Examples from the Marginellidae and other families illustrate my application of this procedure in the Mollusca.

Questions and comments followed this discussion, which was illustrated with slides.

Following a short intermission the meeting resumed with announcements by the Chairman regarding the display cabinets and the Executive Board meeting to be held following the afternoon session.

DIVERSIFICATION OF FEEDING TYPES IN THE GASTROPODA.
James W. Valentine, Dept. of Geology, University of California, Davis,
California.

(Abstract)

During the Mesozoic, gastropods became greatly diversified in feeding types, which arose or deployed into many biotopes in distinctive proportions.

Feeding-type diversity ratios similar to those of today seem to have become established by the Late Cretaceous. The diversification was related to the spread of the advanced orders but also involved older stocks. Modernization of the marine gastropod fauna was not chiefly a matter of replacement of old with new lineages, but involved a major shift in mode of trophic level.

Changes in proportions of feeding types occur along latitudinal gradients ultimately related to climate, and between provinces with major differences in their physical environmental framework, as between coastal plain and coastal mountains.

Feeding-type diversity in Cenozoic gastropod associations, then, depends upon climatic and environmental frameworks and upon the particular biotopes from which the fossils are assembled. Consideration of feeding types can be especially important as furnishing information on biologic relations between preserved and nonpreserved parts of the original living assemblages.

Dr. Myra Keen, of Stanford University, then gave an interesting talk about her recent studies at the British Museum of Natural History and at other European institutions.

SEARCH FOR TROPICAL WEST AMERICAN MOLLUSCAN TYPES IN SOME EUROPEAN MUSEUMS. A. Myra Keen, Stanford University, Stanford, California.

(Abstract)

During the summer and autumn of 1964, I had the privilege of studying abroad. Most of the time was spent at the British Museum (Natural History), in London, and a few days at the University of Copenhagen, Denmark. This report is a brief summary of my findings. A series of papers will be necessary to list the material actually seen and photographed.

The Mazatlan collection described by P. P. Carpenter is, from our point of view, the most important one there, because few of the specimens have ever been figured. Carpenter planned to publish the camera lucida drawings he had made, but these remain manuscript. When he donated the collection of shells to the British Museum, he requested that it be kept intact. It remains so, mounted, as he left it, on glass slides—over 2,500 lots. The types of the new species have been segregated from the rest for convenience of study. Of the 260 species he had described, I found that the types of 87 were large enough and in good enough condition to photograph. I made camera lucida drawings for 168 of the smaller forms.

Another important suite of West American material at the British Museum was that described by R. B. Hinds in the "Voyage of the Sulphur." Of 101 species he named, type material for 54 can be recognized. Many of these are syntypes rather than figured holotypes.

One would expect that the material described by Alcide d'Orbigny in the "Voyage d'Amérique Méridionale" would be in Paris, but Dr. J. E. Gray, a century ago, acquired Orbigny's collection for the British Museum (including also Caribbean and Canary Island material). The collection has remained intact and almost untouched. I was able to find all but two of the 26 West American holotypes for which I searched.

The Hugh Cuming collection is, of course, the largest general collection of

its day. It was used freely by Reeve, Sowerby, and others as a basis for illustrations and descriptions, and a gratifying number of these specimens are still available. The trustees of the British Museum purchased this collection in the 1860's.

One unexpected find at the British Museum was a suite of the material from the Nuttall collection that Conrad had used for describing California shells in his pioneer paper in 1837. A few even of Conrad's figured specimens are there; the rest are syntypic lots—27 out of a possible 57.

At the University of Copenhagen, many of the forms described by O. A. L. Mörch in 1859–1861 have come to light in recent years. Through the courtesy of their Zoology Museum staff, I have seen and also have photographs of more than two-thirds of Mörch's tropical West American marine shelled forms—34 out of 44. It is possible that additional material can be found upon further search. These unfigured types are going to cause us more nomenclatural problems than any other of the suites of type material I studied.

* * *

The afternoon session was concluded at 4:30 with thanks to the speakers by Chairman Allison. Following this the Executive Board met.

Thursday evening the banquet was held at Fisherman's Wharf Grotto overlooking San Diego Bay, the beautiful setting and convivial atmosphere making it an enjoyable evening for all. The table decorations were cleverly handled by Ruth and Ben Purdy and committee, and the Hospitality Committee made everyone feel at ease.

Chairman Allison opened the after-dinner meeting with the introduction of members and guests seated at the head table. Following this he introduced members of the San Diego Shell Club, who served as Committee Chairmen for the AMUPD meeting. He also expressed appreciation for all the help they and their committees had so generously given.

The Award of Honor was presented to Dr. Rudolf Stohler for his outstanding contributions to malacology. This was accepted with appreciation and thanks. The meeting was then turned over to Dr. Joshua L. Baily, Jr., who gave an interesting and humorous talk on "Some More Conchological Miscellanies." He presented some little-known information about famous people who are not ordinarily connected with malacology.

* * *

Friday morning's sessions began at 9:00 A.M. with the Chairman's announcement that Walter Miller was not able to be present, but that his paper would be read by Dr. Joseph Bequaert.

PRELIMINARY OBSERVATIONS ON *SONORELLA* IN ARIZONA AND MEXICO. Walter B. Miller, Tucson, Arizona.

(Abstract)

As a prerequisite to a study of Mexican populations of *Sonorella*, a detailed survey of Arizona species has been under way for about 1 year. In addition, some preliminary explorations into Mexico have been made. Preliminary observations which may be of interest to malacologists are in the following areas:

1. Anatomy of *S. magdalenensis* (Stearns) and its affinities with the group of *S. tumamocensis* P & F.
2. Relationships within the group of *S. tumamocensis* P & F.
3. Anatomy of *S. sabinoensis hesterna* P & F.
4. Extension of western limits of distribution of *Sonorella* to the Ajo Mountains.

1. *Sonorella magdalenensis* (Stearns) was collected in quantity in January, 1965 both from the mountain immediately north of Magdalena and from another range of mountains about 5 miles south of the city, in Sonora. There is a significant difference in the average size of the adult shells from the two localities but no consistent difference in the anatomy of their genitalia, which showed the same shape, type, and size of structures as *S. arida* P & F.

2. In the group of *S. tumamocensis* P & F., Pilsbry in 1939 made many synonymies. With *S. arida* P & F., he synonymized *S. hinkleyi* P & F., *S. tumacacori* P & F., and *S. cayetanensis* P & F. Three of the above-named races occur in separate, isolated mountain ranges. Shell characteristics vary but not significantly. Pilsbry did not have an anatomy of *S. arida* P & F. from the type locality but felt justified in making the synonymy on shell characters alone. I have examined several animals of *S. arida* P & F. from the type locality and they corroborate fully this synonymy. In further investigations, I have also found that the vaginal node of *S. arida* P & F. which is one of the main factors separating that species from *S. tumamocensis* P & F. is also present in that latter species. It is possible that Pilsbry overlooked it because he had to work with preserved specimens. This node is also very prominent in *S. magdalenensis* (Stearns). It appears at this time as though there are no consistent, significant differences between *S. arida* P & F., *S. tumamocensis* P. & F., and *S. magdalenensis* (Stearns).

3. Pilsbry put *S. sabinoensis hesterna* P & F. in the group of *S. sabinoensis* P & F., based on shell characters alone. He had been unable to obtain live animals for anatomy studies. I have examined live animals from the type locality and I have found that the genitalia are essentially the same as those of *S. rinconensis* P & F. Further study is necessary to determine if there is any consistent, significant difference between *S. s. hesterna* P & F. and *S. rinconensis* P & F.

4. Dr. Joseph Bequaert of the University of Arizona and I have collected quantities of *S. baboquivariensis* ssp. in Arch canyon in the Ajo Mts. in Arizona. This represents a new western limit for this species, as well as for the genus, over the previously reported limit near Comovo in the Papago reservation. It is interesting that this new locality is only about 30 miles from the type locality of *Micrarionta rowelli mexicana* Pilsbry and Lowe. This immediately brings to mind conjectures as to origin, phylogeny, and migrations of Sonorellinae and Helminthoglyptinae.

EVOLUTION OF SWIMMING IN THE LIMIDAE AND PECTINIDAE.
T. H. J. Gilmour, Department of Biology, University of Saskatchewan, Saskatoon, Saskatchewan, Canada.

(Abstract)

Both G. A. Drew and C. M. Yonge have suggested that the features which preadapted the Limidae and Pectinidae for swimming were originally con-

cerned with cleansing of the mantle cavity. They suggested that cleansing currents of water expelled at either end of the mantle cavity came to be used for free swimming. They could not account for the origin of the anterior water current. In this paper it is shown that the complicated lip-apparatus of the Limidae and Pectinidae diverts water towards the anterior end of the mantle cavity. This water current was originally a by-product of the lip-apparatus but came to assist in cleansing the mantle cavity and eventually, in free-living species, came to be used for locomotion.

An intermission followed, during which coffee and doughnuts were served by the San Diego Shell Club.

David Emerson of the University of South Dakota gave an illustrated talk.

TISSUE HYDRATION DURING DESICCATION OF THREE SPECIES OF INTERTIDAL PROSOBRANCH SNAILS. David N. Emerson, Department of Zoology, Laboratories of Zoophysiology, University of South Dakota, Vermillion, South Dakota.

(Abstract)

Correlation between zonal distribution and resistance to desiccation of intertidal gastropods is well known. However, previous studies of marine snails have not considered changes in actual tissue hydration. *Calliostoma ligatum* (Gould, 1846), *Tegula funebris* (A. Adams, 1854), and *Littorina scutulata* (Gould, 1849) were collected during July, 1964 from Point Arago, Oregon. Snails were placed in desiccators over CaCl_2 and were weighed periodically to the nearest mg until 50% of a species was dead. Weight decreases were considered as water loss. The data summarized in Table 1 shows significant correlations between distribution in the intertidal zone with time of survival, percent of total original water lost, and percent tissue hydration before death. The decrease in percent of total original water is much greater than the decrease in percent of water in the tissues. Von Brand, et al. (1957, Biol. Bull. 113: 89) attributed a similar phenomenon in *Australorbis glabratus* to the view that overall tissue hydration does not decline to the same extent as the decrease of total original water because the remaining water hydrates the tissues.

The differences between end points for percent tissue hydration before death would become less significant if other factors are considered. Table 2 shows that the end point for *T. funebris* is slightly raised if glycogen loss is considered.

Table 1

Species	Range (ft) in inter- tidal zone ¹	Survival (hrs to 50% dead)	% of original total H_2O lost at 50% dead ²	% tissue hydration at start ²	% tissue hydration at 50% dead ²
<i>C. ligatum</i>	-2.0 to 1.0	42	14.4 ± 1.6	73.8	70.6 ± 0.9
<i>T. funebris</i>	1.8 to 5.2	144	23.0 ± 1.5	69.0	63.2 ± 0.3
<i>L. scutulata</i>	3.0 to 5.5	228	64.6 ± 5.9	79.8	59.4 ± 3.3

¹ From Hewatt, 1937, Am. Midl. Nat. 18: 161.

² The relative weights of shell and soft parts needed to calculate these figures are given in Emerson, 1965, The Veliger 8(2): in press. The \pm signs give confidence limits at the 95% level.

Table 2

% glycogen fresh snail ¹	% glycogen starving snail (144 hrs, 96% relative humidity)	% glycogen snail desiccating over CaCl ₂ (144 hours)	% tissue hydration corrected for gly- cogen loss (50% dead)
1.93 ± 0.16 (61)	1.32 ± 0.26 (12)	0.85 ± 0.19 (12)	63.5

¹ From Emerson, 1965, The Veliger 8(2): in press. The ± signs give confidence limits at the 95% level. The figures in parentheses indicate the number of determinations. Glycogen is expressed as percent of dry weight of soft tissues.

The end point of *L. scutulata* would approach the others if tissue loss was considered. Also, *C. ligatum* probably died for reasons in addition to desiccation before critical water loss was reached. The end point for this species would approach that of the other two if death was due only to desiccation.

Table 2 also indicates that desiccation of *T. funebris* causes a stress which depletes glycogen levels faster than starvation alone. A Pasteur effect is suggested in which glycogen is utilized at a faster rate during anerobic conditions. Such conditions may exist during desiccation when the operculum is tightly closed.

Dr. Myra Keen next showed some slides of her recent travels.

SOME CONTRASTING SEASHORES, PACIFIC AND ATLANTIC. A.
Myra Keen, Stanford University, Stanford, California.

(Abstract)

The opportunity to visit several East and West Coast areas in rapid succession during the past few months has pointed up for me the contrasts in ecology. Coral reefs and mangrove swamps are much more widespread in the Caribbean than on the West Coast. The continental shelf area is wider. The dominant marine plant (a seed-plant, not an alga) is turtle grass or *Thalassia*, common in the West Indies but not known on the West Coast. Tropical algae of both shores are of smaller size and more limited variety compared to the kelp and other seaweeds of the temperate zone waters of both coasts. Molluscan populations are, of course, affected by the ecologic factors. At least, in the areas I visited, the Caribbean has the more prolific near-shore molluscan fauna.

Dr. S. Stillman Berry, Redlands, California, concluded the morning's session with "GOOD MOLLUSCAN BIBLIOGRAPHIES—FEW AND FAR BETWEEN." He illustrated his talk by giving many types and compilers of bibliographies and explained that all those publishing papers should present good bibliographies. Following this instructive talk there were many questions and comments from the audience.

GOOD MOLLUSCAN BIBLIOGRAPHIES—FEW AND FAR BETWEEN.
S. Stillman Berry, Redlands, California.

(Abstract)

Nearly a lifetime of labor in compiling a card bibliography of living Cephalopoda, supplemented by his early experiences in gathering the

founding library of the Scripps Institution of Oceanography, has led the speaker to a lively appreciation of the unique value of sound bibliographic work in any field of study and the strange deficiencies in this respect shown by many segments of malacology. Now that the literature has become so varied and so vast, even a good *general* working bibliography of Mollusca would be a boon, especially if concisely and trenchantly annotated. We now have to depend heavily on unsegregated library catalogues such as those of the British Museum (Natural History), often not available, or Casey Wood's catalogue of the books on vertebrates at McGill University, where much that is molluscan is to be found in many of the more generalized citations. In Britain, Sherborn, Salisbury, Reynell, Winckworth, Tomlin, Iredale, and others have published much fine and needed work, but it is so scattered amongst a variety of journals that a bibliography of these contributions themselves is almost in order.

A good start for the American fauna was made over a century ago by W. G. Binney and P. P. Carpenter, but except for Binney's specialized work on the contributions of Rafinesque and Say, no really exhaustive overhaul was attained. Since their time we have been favored with, and also need more of, such fine particulate studies as the excellent Smithsonian bibliographies of R. E. C. Stearns (by Mary Stearns) and of W. H. Dall (by Bartsch, Rehder, and Shields), the A.M.U. bibliography of H. A. Pilsbry, and the recent extremely valuable review of the work of A. A. Gould by Richard Johnson. We have a near model for studies of this type which would be hard to surpass, especially in its minuscule completeness of citation, in the 1933 British Museum "Catalogue of the Works of Linnaeus," but despite its meticulous care and scholarship the manner of its arrangement sometimes makes it a bit hard to use. In a lesser area we could certainly do with something as capable to cover the confusingly overlapping labors of the prolific Sowerby clan, with emphasis on the three successive George Brettingshams!

Amongst subject bibliographies that we have found notably excellent and helpful in one respect or another may be mentioned those by F. C. Baker (1911) in his great monograph of the American Lymnaeidae, Pfeffer (1912) on the oegopsid cephalopods, Robson (1929-31) on the octopods, Fretter and Graham (1962) in their recent superb volume on the British prosobranchs, Keen (1958) in her "Sea Shells of Tropical West America," J. L. Baughman (Texas A. & M.) on oysters, and Henry Dodge (1852-59) in his valuable series of papers on the molluscan species of Linnaeus.

The Linnean and pre-Linnean eras provide an especially rocky field which ought to be freshly raked and thoroughly tilled, yet we are not without some helpful beginnings in the Maton and Rackett 1804 paper for the Linnean Society, in the curious and rather rare William Wood "Catalogue of . . . the best works on Natural History" (London, 1832), in Burrow's "Elements of Conchology" (London, 1815), and, most unexpectedly, in pp. 97-106 of H. Simroth's Amphineura monograph in Bronn's Thier-Reich (Leipzig, 1892). The remaining pages of the Simroth list, covering publications subsequent to 1800, are also of value.

As future subjects of much-needed special bibliographies one might suggest chitons, pteropods, west American land snails, and the West Coast marine Pliocene and Pleistocene. Other candidacies will occur quickly to any active student. Bibliographies in other limited fields should be as exhaustive and

as fully and completely cited as possible. The larger and more scattered the literature and the more difficult for general consultation, the greater the need.

* * *

The Friday afternoon session reconvened at 2:00 P.M. James R. Lance, of Scripps Institution of Oceanography, gave a beautifully illustrated talk entitled "COLOR PORTRAITS OF SHELL-LESS MOLLUSKS." He explained that the opisthobranchs are a type of mollusk characterized primarily by a reduction or absence of shell. In the nudibranch order there is no shell present except in the early larval stage. They are strictly marine, appearing in all seas.

Questions and comments followed this well-received talk.

Dr. Stillman Berry then gave a brief addenda to his morning's discussion, adding some comments regarding biological abstracts and the problem of lost literature.

After an intermission the meeting resumed with a motion picture of nudibranchs, shown by Wesley Farmer. As in Mr. Lance's color slides, the audience was delighted by the beauty of color and form shown in these artistically photographed creatures of the sea.

Dr. Joshua L. Baily then gave a brief and informatively humorous talk on "THE IDENTITY OF *PHYSA OSCULANS*." The consensus appears to be that there is no agreement on this subject.

Dr. Donald R. Shasky of Redlands, California showed interesting slides of the San Juan Expedition of 1963. This presentation included some remarkable illustrations of the dredged shells, which inspired questions and comments from the receptive audience.

Wesley Farmer, of the San Diego Museum of Natural History, brought the afternoon's session of papers to a close.

BIRD ROCK SURVEY. Wesley Farmer, San Diego, California.

The Bird Rock survey was conducted in 1956 and 1957 by Jack Littlepage and Wesley Farmer at Bird Rock, a rocky intertidal area about 3 miles south of La Jolla, California. We set up a checking point (table) on a ramp of the only access to the area and counted and identified the animals taken by the student, businessman and woman, and general observer of the intertidal area.

As the result of the census, we found that, generally, rocks were not turned back. We also found that numerous animals were taken from the area during the 35 days from October through March that we were taking the census. We found that based on a conservative calculated count, about 10,000 animals were taken from Bird Rock. For example, 301 *Aplysia californica*, were taken by actual count.

We came to the conclusion that animals are repopulating the intertidal area at Bird Rock during the summer months when the tides are low in the early morning.

At one time, during a sunny Sunday low tide, more than 200 persons were "low tiding."

The Executive Board then met and concluded their unfinished business of the previous afternoon.

On Friday evening, following dinner at the California Western Dining Hall, the group reassembled to enjoy the talk and motion pictures of Keith Cox of the California Department of Fish and Game. He showed an interesting film of "The Japanese Pearl Industry" and also films of abalone hatcheries. The possibilities of establishing shellfish hatcheries in California under the auspices of the Department of Fish and Game was then discussed.

Slides from previous AMUPD meetings were shown by Mead French, and the evening concluded with a general social gathering.

* * *

Saturday morning's session was called to order at 9:00 A.M. Dr. Wheeler J. North, of the California Institute of Technology, gave the first paper, entitled "ANIMAL HABITATS IN THE SCUBA ZONE." He first explained that there is a great diversity of habitats in this zone, as it covers the depths of five feet to one hundred and fifty feet, the area in which people can collect with scuba equipment. His talk focused attention on the points which the various habitats have in common, such as substrata, energy source, and food source.

MOLLUSKS AS A PART OF THE SHALLOW SUBLITTORAL BIOTA.

Robert R. Given, Allan Hancock Foundation, University of Southern California.

(Abstract)

The "shallow sublittoral biota" is loosely defined and discussed here as those plants and animals living on the ocean floor between the lowest subtidal level and the 180' depth range. The present studies are further restricted to those organisms comprising the *epifauna*, or rocky-reef dwellers, as opposed to those of the *infauna*, or level-bottom dwellers. The mollusks, particularly the gastropods and pelecypods, form an integral part of the makeup of this complex rocky reef fauna. They occupy many different niches, and are found in all situations ranging from complete coverage of a rock surface (as an abalone) to a tiny commensal living on a starfish.

After an intermission the lectures resumed; movies taken from the diving saucer illustrated this paper.

BIOLOGICAL OBSERVATIONS IN THE SAN DIEGO AREA WITH THE DIVING SAUCER. Richard F. Ford, Department of Biology, San Diego State College.

(Abstract)

During the period February, 1964 through April, 1965 ecologists at Scripps Institution of Oceanography made a series of observation dives within the depth range 50 to 300 m on representative areas of the continental shelf off San Diego, California, using the Cousteau Diving Saucer. An attempt was made to determine the species composition of the conspicuous epibenthic fauna, to estimate the bathymetric distributions and densities of individual species, and to obtain additional information on the natural history of these species, where possible. Information was obtained by means of a continuous voice recording of visual observations, 35 mm stereo still photographs, 16 mm motion pictures, and the collection of specimens during transects run approxi-

mately perpendicular to the depth contours. Preliminary results suggest that most species show definite zonation in relation to depth and that, while certain species are common to all areas surveyed, species composition and diversity differ in relation to locality.

The meeting reconvened at 2:00 P.M. with this paper:

THE MACROFAUNA COMMUNITIES OF THE SOUTHERN CALIFORNIA MAINLAND SHELF. Gilbert F. Jones, Allan Hancock Foundation, University of Southern California, Los Angeles.

(Abstract)

More than 20 macrofaunal communities have been recognized on the mainland shelf of southern California. The most extensively distributed association is dominated by the smooth red ophiuroid *Amphiodia urtica* and occurs generally along the outer edge of the shelf. In the Santa Barbara area this association is modified by a codominant pelecypod *Cardita ventricosa*. In areas of increasing sand content, the *Amphiodia urtica* association is altered by the addition of the subdominant polychaete *Onuphis nebulosa*. Large areas of the San Pedro shelf are dominated by the ophiuroid *Amphioplus hexacanthus* and accompanied by *Amphiodia urtica* as a subdominant.

Inshore from the *Amphiodia-Cardita* community in a large silt bed off Santa Barbara is a unique association dominated by the echiuroid *Listriolobus pelodes*.

Shallow silty sand and sand bottoms support communities dominated by the clam *Tellina buttoni* and the polychaete *Nothria elegans*, but where these flats merge with the sands just seaward of the surf zone the tiny polychaete *Prionospio* becomes dominant. On coarse sand bottoms near headlands, kelp beds or low rocky outcrops the tube-dwelling polychaete *Diopatra ornata* often dominates; small but well-developed beds of another polychaete, *Chaetopterus variopedatus*, occur on coarse black sand bottoms off the Palos Verdes headland. On the coarse red sand areas of Santa Monica Bay, San Pedro Bay, and off San Diego two other polychaetes, *Nothria stigmatis* and *Spiophanes bombyx*, dominate.

In deep water, seaward of the *Amphiodia* and *Amphiodia-Cardita* communities the shelf and slope bottoms are often populated by an association dominated by the polychaetes *Chloeia pinnata* and *Pectinaria californiensis*.

These represent the major well-defined benthic communities of the southern California mainland shelf.

Sampling on the mainland shelf of southern California has shown that in this area mollusks do not play the impressive role of faunal dominance that is reported from other parts of the world, and that they are conspicuous only in a limited number of communities. Mollusks averaged 16.5% of the total number of species, and 12.0% of the total number of specimens in 335 0.25 m² Hayward orange-peel bucket samples. They made up only 13.2% of the total macrofaunal standing crop (based on 495 OPB samples).

Three major animal communities (the *Amphiodia-Cardita*, the *Listriolobus*, and the *Nothria-Tellina* communities) on the northern portion of the mainland shelf of southern California have important molluscan elements. Specimens of the pelecypod *Cardita ventricosa* comprise about half of the total standing crop in the *Amphiodia-Cardita* community. Polychaete

worms rank second. The gastropod *Bittium rugatum subplanatum* is prominently associated with *Cardita*.

Saxicavella pacifica is the most characteristic mollusk of the *Listriolobus* community. In spite of its close association (97%) with the dominant organism and a density of 30 specimens/m², a low mean standing crop value of 4 g/m² for *Saxicavella* precludes it from consideration as a co-dominant with an organism that averages 944 g/m².

Inshore of the *Listriolobus* community the bottom sediments become progressively coarser, grading from sandy silts to silty sands, and finally to sand. These sand bottoms contain a complex of animal associations dominated by a variety of organisms, including the polychaetes *Nothria elegans*, *N. irridescens*, *Prionospio malmgreni*, and *Diopatra ornata* and the pelecypod mollusk *Tellina buttoni*. The gastropod *Olivella baetica* is prominently associated with *Tellina*. Areas of kelp and rock complicate the faunal pattern in this shallow zone.

In the southern portion of the southern California shelf, south of Hueneme submarine canyon, only a single faunal association is extensively distributed: The *Amphiodia urtica* community, which occurs generally on the outer portion over the entire length of the southern shelf. Here the most abundant mollusks in the community are the pelecypods *Axinopsida serricata*, and *Mysella* spp. Inshore from the *Amphiodia* community, in most regions, sand bottoms are dominated mainly by polychaete communities: the *Nothria*-*Tellina*, *Diopatra*, and *Prionospio* communities. The molluscan fauna of these areas includes a number of small gastropod and pelecypod species. Shallow bottoms may undergo extensive local modification as a result of high population densities of the echinoid *Dendraster excentricus*. Rock and kelp modify other areas. The molluscan fauna of the central shelf projection of Santa Monica Bay, the Palos Verdes shelf, the San Pedro Bay shelf, and the southern portion of the San Diego shelf is highly diversified and reflects the complex character of the sediments. The only faunal association involving a pelecypod mollusk on the southern portion of the shelf, that has received adequate study, is the association of the pelecypod *Lima dehiscens* with the parchment worm *Chaetopterus variopedatus*.

* * *

Following the afternoon intermission, Eric G. Barham, of the Navy Electronics Laboratory in San Diego, spoke on "Megafauna of the San Diego Trough: Bathyscaph Observations." This was an entertaining as well as instructive talk, which was enjoyed by the audience.

Chairman Edwin Allison then brought the general session to a close by expressing his appreciation to the speakers, members, and guests attending, and to the San Diego Shell Club for acting as hosts for the meeting and for contributing so greatly to its success. He also extended a cordial invitation for participants and guests to attend the party being given that evening in Imperial Beach by the San Diego Shell Club.

The luau given that evening under the very capable leadership of Jane Stotter and her committee surely was one of the highlights of the 1965 meeting. The Hawaiian motif was carried out by beautifully decorated tables laden with hibiscus, and among the lavish refreshments were pineapples and other tropical delicacies. The delightful punch gave off volcanic vapors to

astound the beholders. As entertainment, Billie Dilworth and Twila Bratcher demonstrated authentic Hawaiian dances and music. The shell collecting magician, Ormond McGill, amazed and delighted all with his clever manipulations. This was an evening enjoyed by all, and it brought the meeting to a wonderful climax.

On Sunday morning tours were arranged for those members and guests not having to meet travel schedules. A trip to Sea World at Mission Bay engaged the attention of many, while others visited Scripps Institution of Oceanography, the Museum of Natural History, the San Diego Zoo, and other San Diego points of interest. Some ardent collectors remained in San Diego a few days longer and braved the early morning low tides to collect on the Mission Bay Jetty.

The Transportation Committee, under the capable leadership of David Mulliner, met arriving guests, provided transportation between the Lodge and Dining Hall, and assisted John Souder, Field Trip Chairman, in arranging the tours. The San Diego Shell Club, acting as hosts, and all others who contributed to the meeting, deserve a great many thanks for the work, time, and effort which so many put forth to assure the success of the 1965 AMU-PD meeting. George Hanselman assisted in many ways as Coordination Chairman. Reception and Refreshment Committees, under the direction of Billie Dilworth and Connie Finley, added greatly to the pleasure of the meeting. The presentation of the speakers' many fine pictures and the shell exhibits were skillfully arranged by Wesley Farmer and Tana Hemingway, respectively.

The following people provided exhibits, which were displayed in glass cases at the Lodge: George Hanselman, chitons of the Pacific Coast; Jo Blake, shell leis from Tahiti; Wesley Farmer, plastic nudibranchs; Helmut Meier, plastic mollusks (in real shells); Ross Stotter, Volutes of the World; Lawrence Thomas, scuba collected shells from Mexico; Cookie Wingard, mounted seaweeds from Washington; Emery Chase, scrapbooks of photos of early malacologists and growth and variation series of *Ceratosoma foliata*; Charleen Neeb, San Diego shells; Myra Keen, photos of holotypes from British Museum and cartoons related to shells; Chuck Finley, *Neosimnia* from San Diego (probably a new species); George Kanakoff, fossil micro shells and foraminifera; Bill Naylor, *Murex carpenteri*; John Phillips, *Murex*; and John Souder, *Cypraea tigris* from Hawaii.

Respectfully submitted,

BARBARA J. GOOD, *Secretary AMU-PD*

* * *

MINUTES OF BUSINESS MEETING

The annual Business Meeting of the American Malacological Union-Pacific Division was called to order by the Chairman, Dr. Edwin C. Allison, at 4:30 P.M., June 26, 1965.

Chairman Allison announced that Crawford Cate would automatically second all motions made.

It was moved, seconded, and carried unanimously that the minutes of the 1964 Business Meeting at Asilomar be accepted as printed in the AMU

Annual Report with the following correction to be added at this date: (To be inserted on page 51, 4th line from the bottom). It was moved, seconded, and carried that a portable adding machine be purchased for the use of the Pacific Division Treasurer.

The Treasurer gave a report indicating a current balance on hand of \$540.00. The report is to be supplemented at a later date. The report as given was accepted.

It was moved, seconded, and passed unanimously that the Pacific Division pay the sum of \$25.00 to the AMU as final installment on the repayment of advances made to the Pacific Division in past years.

Dr. Rudolf Stohler, Chairman of the Bylaws Revision Committee, gave the following report. He stated that the present AMUPD Bylaws need a complete revision, but that this could not be done at the present time. As they stand they work a hardship on some of the officers of the AMUPD, as they are drafted to fit the needs of the AMU as a whole and not of the Pacific Division. He asked that the following interim corrections and amendments be made until such time as the Bylaws could be completely revised.

The following amendments and corrections to the AMUPD Bylaws were moved, seconded, and after discussion on some points, were unanimously carried.

During the 1965 AMU meeting the Executive Council went on record as giving unanimous approval to these amendments and corrections.

* * *

AMENDMENTS TO BYLAWS OF AMUPD

Article II, Section 5:

(1) Terms of office of those officers shall normally be one year, beginning one month after election at an annual meeting.

Section 6:

(1) The chairman shall preside at annual meetings and be generally responsible for the activities of the Pacific Division. He shall appoint a Nominating Committee, and such other committees as he deems desirable, and at the end of his term he shall appoint an Auditing Committee and a Mentor-Parliamentarian to serve during the term of his successor.

(3) The Secretary shall take all minutes of Executive Board and Business Meetings, transcribe them as promptly as possible, and transmit copies to the Chairman (for review) and to the Mentor-Parliamentarian (for his permanent record).

(5) The Treasurer shall be responsible for handling and recording all incoming and outgoing funds of the Pacific Division, including such funds (Convenience Funds) collected and disbursed for the convenience of the membership, e.g., for conference accommodations, group photographs, etc., which represent no income or expense to the Division. He shall receive such AMU dues and Division assessments from regular and new members as may come to him and shall forward them promptly to the AMU Treasurer. He shall keep an up-to-date list of the AMU members within the Pacific Division area who are in good standing, based on the list maintained by the AMU Treasurer, and shall keep the Division Secretary informed of the current status of this list.

(8) At the annual meeting of the Board and at the annual Membership meeting the Treasurer shall submit a financial report on the general division fund. Within 60 days after the annual meeting the Treasurer shall submit a financial report in triplicate of the general division fund and all convenience funds handled during the conference to the Auditing Committee for approval and signature and to the outgoing Chairman for review and signature and transmittal to the newly elected Chairman. This shall constitute a final financial report including all monetary transactions of the Division during his term of office.

(9) At the annual meeting the outgoing Chairman shall appoint a Mentor-Parliamentarian who will be an ex-officio member of the Board of Directors, without vote. The Mentor-Parliamentarian will serve in an advisory capacity to incoming officers on questions relating to the bylaws, and to procedures as reflected in the minutes and other records of the Division. Notwithstanding anything in these bylaws, the same person may be reappointed to this position by subsequent chairmen.

Article IV, Section 2:

(1) Any Pacific Division assessment shall be paid to the AMU Treasurer with the regular AMU dues.

Section 2, first paragraph, last sentence: The current assessment shall be fifty cents (\$.50) per member, only honorary members excepted.

Section 3:

Amend the entire first paragraph by changing (1), (2), (3), and (4) to (a), (b), (c), and (d).

(a) A registration fee to be paid by all who attend the annual conference either full or part time, except Honorary Members and officially invited guests attending, in an amount established by the Chairman after consultation with the Division Treasurer; Pacific Division Members who have paid an annual assessment will have the amount of the assessment deducted from the registration fee.

* * *

Crawford Cate, Chairman of the Nominating Committee, proposed the following slate of officers for 1965-1966: Chairman: Dr. Alan J. Kohn; Vice-Chairman: Dr. Victor Loosanoff; Treasurer: Col. Harvey A. Johnson; Secretary: Elsie Marshall. It was moved, seconded, and carried that the slate as proposed be accepted. As there were no further nominations from the floor, it was moved, seconded, and carried that the Secretary be instructed to cast a unanimous ballot for these officers.

Chairman Allison next brought up for discussion the 1966 AMUPD Meeting, which is to be held in Seattle, Washington. Facilities for this meeting are available at the University of Washington from June 8 through 11, but probably not at any other time. Discussion from the floor brought out the fact that this would eliminate many in the teaching profession from attending. It was stated that probably at least 50% of the membership would be affected and would be unable to attend.

The Chairman also advised that we have three other invitations for future meetings, one from the City of Long Beach through John Q. Burch, one

from the Bowers Museum of Santa Ana through Merton Hinshaw, and one from the Yucaipa Shell Club.

It was moved, seconded, and carried that the Secretary be instructed to note the above in the records.

It was further moved, seconded, and carried unanimously that this information be passed on to the newly elected Vice-Chairman.

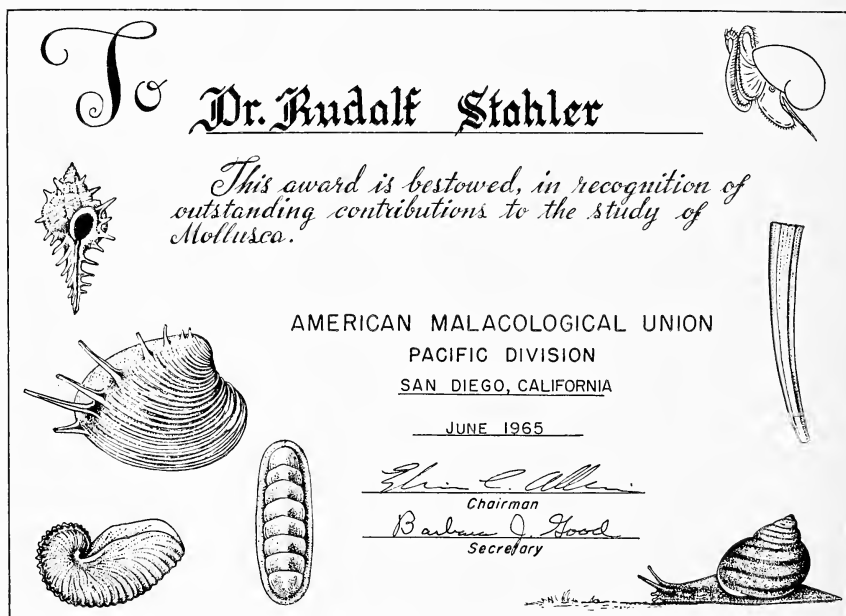
Mr. Chace commented that we might consider meeting places other than institutions, as hotels had been satisfactory in the past and could be considered.

It was moved that a special vote of thanks to the San Diego Shell Club be put on record for the work, time, and effort they had contributed to making this meeting so enjoyable. This was amended to the effect that this proposal be communicated in the form of a letter sent to the San Diego Shell Club.

The motion, as amended, passed unanimously.

Meeting adjourned at 5:15 P.M.

* * *



Dr. Rudolf Stohler, of the Zoology Department of the University of California at Berkeley, was the recipient of the Award of Honor presented by the Pacific Division of the American Malacological Union at its eighteenth annual meeting held in San Diego.

Dr. Stohler was presented with this award because of his outstanding contributions to malacology and his unflinching interest in and assistance to both the amateur collector and the advanced malacologist. He is a past chairman of the AMUPD and has contributed greatly to the growth of this organization. He also serves as the editor of the *Veliger*.

ATTENDANCE LIST—1965 ANNUAL MEETING

Mrs. Edith M. Abbott, San Dimas, California
Dr. Edwin C. Allison, San Diego, California
Mrs. Gladys Archerd, Berkeley, California
Dr. Joshua L. Baily, Jr., San Diego, California
Stella Barron, Redlands, California
Arylene Bayles, Yucaipa, California
Grace Behrens, Santa Barbara, California
Dr. and Mrs. Joseph Bequaert, Tucson, Arizona
Mr. and Mrs. Fred Berg, Santa Barbara, California
Joe Berry, San Diego, California
Dr. S. Stillman Berry, Redlands, California
Mrs. Josephine Blake, San Diego, California
William F. Blankley, San Diego, California
Mrs. Priscilla Blesch, Burlingame, California
Mr. and Mrs. Ford Bratcher, Hollywood, California
Mrs. Helen Breyman, Burlingame, California
Dorothy Brown, San Diego, California
Mr. and Mrs. John Q. Burch, Los Angeles, California
Alice Burton, Oakland, California
Helen Burton, Oakland, California
Mr. and Mrs. Crawford N. Cate, Los Angeles, California
Mr. and Mrs. Emery P. Chase, San Diego, California
Eugene Coan, Palo Alto, California
Mr. and Mrs. Keith Cox, Woodside, California
Frances Cramer, Los Angeles, California
Mr. and Mrs. Richard Dilworth, San Diego, California
Dr. Fred Duerr, Vermillion, South Dakota
Mr. and Mrs. Joseph DuShane, Whittier, California
Rene DuShane, Whittier, California
David Emerson, Vermillion, South Dakota
Dr. William K. Emerson, New York, New York
Wesley Farmer, San Diego, California
Mrs. Constance Finley, San Diego, California
Effie Forthun, Seattle, Washington
Mr. and Mrs. Mead French, San Pedro, California
Ruby Garrett, South Pasadena, California
Dr. and Mrs. T. H. J. Gilmour, Saskatoon, Saskatchewan
Mrs. Barbara J. Good, San Diego, California
Dr. and Mrs. Fritz Haas, Chicago, Illinois
Mr. and Mrs. George Hanselman, San Diego, California
Mrs. Tana Hemingway, San Diego, California
Jerry Henderson, San Diego, California
Merton E. Hinshaw, Santa Ana, California
Mrs. Ardeane Jennings, Cardiff, California
George Kanakoff, Los Angeles, California
Dr. A. Myra Keen, Palo Alto, California
Gretchen Lambert, San Diego, California
Mary Long, Sonora, California





1. Dr. Fred Duerr, 2. Virginia Hanselman, 3. Emery Chace, 4. Wesley Farmer, 5. Connie Finley, 6. George Kanakoff, 7. Eugene Coan,
8. Frank Russ, 9. Dr. William Emerson, 10. Tana Hemingway, 11. Billie Dilworth, 12. Twila Bratcher, 13. Mead French, 14. Ruth French,
15. David Mulliner, 16. Gretchen Lambert, 17. David Emerson, 18. Arlene Bayles, 19. Evelyn Wilson, 20. Mrs. Fritz Haas, 21. Dr. Fritz
- Haas, 22. Mae Dean Richart, 23. Dr. Edwin Allison, 24. Dr. Joshua Bailey, 25. Mary Long, 26. John Burch, 27. Barbara Good, 28. Fay
- Wolfson, 29. Dr. Rudolf Stohler, 30. Elsie Chace, 31. Dr. Myra Keen, 32. Jean Cate, 33. Crawford Cate, 34. Verda Stauffer, 35. James
- McLean, 36. Kate St. Jean, 37. Gale Sphon, 38. Ray Summers, 39. Ruth Shasky, 40. Dr. T. H. J. Gilmour, 41. Mrs. T. H. J. Gilmour,
42. Charlotte Shuman, 43. Katherine Shuman, 44. Idell Myhre, 45. Grace Behrens, 46. Mrs. Roy Poorman, 47. Mrs. E. E. Wahren-
- brock, 48. Emeline Wingard, 49. Rose Burch, 50. Mrs. V. D. P. Spicer, 51. Priscilla Blesch, 52. Stella Barron, 53. Ruth Newby, 54. Alice
- Burton, 55. Jo Blake, 56. Aiti Richmond, 57. Helen Breyman, 58. George Hanselman, 59. Mrs. Joseph Bequaert, 60. Dr. Joseph Be-
- quaert, 61. Merton Hinshaw, 62. Edwin C. Roworth, 63. Ross Stotter, 64. William Blankley, 65. Dr. Donald Shasky, 66. Dr. S. S.
- Berry, 67. Roy Poorman, 68. Ronald Poorman, 69. Helen Burton, 70. Dr. V. D. P. Spicer, 71. Jan Wigley, 72. E. E. Wahrenbrock, 73.
- Gladys Archard, 74. Mrs. Fred Berg, 75. Fred Berg.

James McLean, Los Angeles, California
Mr. and Mrs. Helmut Meier, Escondido, California
Coleen Melton, Chula Vista, California
Roy L. Morrison, San Diego, California
David Mulliner, San Diego, California
Idell S. Myhre, Lake View Terrace, California
William Naylor, San Diego, California
Charlene Neeb, San Diego, California
Ruth Newby, Yucaipa, California
John Phillips, Oxnard, California
Mr. and Mrs. Roy Poorman and Ronald, Pasadena, California
Mr. and Mrs. Ben Purdy, San Diego, California
Mrs. Mae Dean Richart, San Francisco, California
Aiti Richmond, San Diego, California
Edwin C. Roworth, Cardiff, California
Frank D. Russ, Alameda, California
John B. Saxby, San Francisco, California
Dr. and Mrs. Donald B. Shasky, Redlands, California
Charlotte Shuman, Seal Beach, California
Katherine Shuman, Seal Beach, California
Gale Sphon, Jr., Santa Barbara, California
Dr. and Mrs. V. D. P. Spicer, Centralia, Washington
Mrs. Verda Stauffer, Yucaipa, California
Dr. Rudolf Stohler, Berkeley, California
Mr. and Mrs. Roscoe O. Stotter, Imperial Beach, California
Kate St. Jean, San Bernardino, California
Ray Summers, Petaluma, California
Lawrence Thomas, Morro Bay, California
Helen Thompson, Brawley, California
Dr. J. W. Valentine, Davis, California
Henrietta Vecchio, Solana Beach, California
Mr. and Mrs. E. E. Wahrenbrock, Cala Mesa, California
Mrs. Raymond Webb, Chula Vista, California
Janine West, San Diego, California
Ouida White, San Diego, California
Jan Wigley, Centralia, Washington
Evelyn C. Wilson, Oakland, California
Emmeline Wingard, Gig Harbor, Washington
Fay Wolfson, La Jolla, California

SECOND EUROPEAN MALACOLOGICAL CONGRESS

HENRY VAN DER SCHALIE, *AMU Delegate*

The meetings of the 2nd European Malacological Congress were held on the campus of the University of Copenhagen from August 10 to 14, 1965. The Egmont Hotel, a student dormitory, used as a hotel during the summer, served to house most of those attending the meetings. The student-operated hotel proved to be an excellent facility for meeting in informal visits while meetings were not in session.

The meetings were held in the new Zoological Museum on the campus of the University of Copenhagen. The excellence of the facility for zoological studies and the many courtesies tendered by the staff to those interested in the arrangement of the building and the techniques involved in conserving specimens were exemplary. While there are those who would prefer other arrangements, the careful planning and the excellence of the organization can hardly be excelled even in larger and more wealthy countries.

An official list of participants was distributed among those attending. Some 115 were registered and a tabulation of that list indicates that 23 countries were represented. In number they had the following distribution: Holland was represented by 26; England 19; America 14; Denmark 13; Italy 10; West Germany 8; France 7; Sweden 5; Scotland 4; Russia 3; Egypt, Norway, South Africa and Switzerland each had 2; those with one representative were: Austria, Belgium, Canada, Ghana, Greenland, Hungary, Japan, Portugal, and Romania. The American representatives at the congress were as follows:

John Bayard Burch, University of Michigan; William K. Emerson, American Museum of Natural History; Frank Etges, University of Cincinnati; Julia M. Huber, University of Michigan; E. Alison Kay, University of Hawaii; A. Myra Keen, Stanford University; Edward H. Michelson, Harvard School of Public Health; R. H. Parker, Woods Hole Marine Biological Laboratory; Charlotte Patterson, University of Michigan; Harald A. Rehder, U.S. National Museum; G. Alan Solem, Chicago Natural History Museum; C. R. Stazek, California Academy of Science; Ruth D. Turner, Harvard Museum of Comparative Zoology; Henry van der Schalie, University of Michigan.

The meetings were arranged under essentially two programs. August 10 and 11 were devoted to a symposium on malacology and parasitology. For those interested in the nature of the papers given, a copy of the program follows:

August 10th

Welcome by the president.

C. A. WRIGHT: Intermediate host-parasite relationships in African schistosomiasis.

H. V. D. SCHALIE: Bionomic studies of the snail intermediate hosts of oriental schistosomiasis.

J. A. V. EEDEN: Trends in the distribution of the intermediate hosts of Bilharzia in South Africa.

Lunch.

Excursion I by bus to Danish Bilharziose Laboratory and Danmarks Akvarium, Charlottenlund. The participants were divided into three groups. While one group visited the Bilharziose Laboratory to be demon-

strated by the director G. Mandahl-Barth, the two others were invited to visit the Danmarks Akvarium to be demonstrated by the director, A. Schiøtz. The excursion ended in Charlottenlund. Private return by S-train from Charlottenlund S-station.

August 11th

A. D. BERRIE: Snail size in relation to infection with schistosoma.

J. B. BURCH: Chromosomes of intermediate hosts of human bilharziasis.

J. W. TIEZE-DAGEVOS: The effect of an experimental molluscicide on the eggs of *Australorbis glabratus*.

B. C. DAZO. (title given later)

Lunch.

B. HUBENDICK: Aspects on vector snail control.

E. H. MICHELSON: The specificity of *hemolymph antigens* in the taxonomic discrimination of medically important snails.

T. FENCHEL: On the fauna of ciliated Protozoa in the mantle cavity of mollusks.

J. F. DE AZEVEDO: Some aspects of the ecology of the snails of the Portuguese overseas provinces of Macau and Timor.

One of the highlights of this program was a visit to the new Danish Bilharziasis Laboratory at Charlottenlund. Those working with human blood flukes have known about the role of Dr. G. Mandahl-Barth as an expert in snail determinations for the World Health Organization. While he had to confine his work to preserved materials sent to him from many areas of the world, the new laboratory will enable him to study the snails under excellent facilities for culturing them. This large and carefully designed building was a gift from a private donor so that the laboratory can operate without restrictions that often attend government-controlled facilities.

The congress was held from August 12 to 14. Because of the relatively large number of papers, the papers were arranged in sections to cover the fields of Ecological Physiology, Systematics and Zoogeography, and Structural physiology. While this arrangement was necessary to conserve time it was unfortunate that members had to miss papers they would have liked to attend. The program for the sections follows:

August 12th

Welcome by Mr. Helge Volsø, director of the Zoological Museum.

Formation of a committee to lay before the General Assembly proposals on common research projects.

Presidential address.

Demonstration of the new museum building.

Lunch.

Excursion II a to Frederiksdal. By bus from Zoological Museum 13.00, by boat from Lyngby at 13.30—arrival at Frederiksdal at 14.00—return from Frederiksdal at 16.00 to Holte, where the excursion ended. Private return by S-train back to Copenhagen from Holte S-station.

Excursion III a by bus to Marinbiological Laboratory, Helsingør. Return to the Zoological Museum by bus, where the excursion ended.

August 13th

Section A (*Ecological physiology*).

C. M. PATTERSON: Chromosome numbers and systematics of streptoneuron snails.

B. PRESCOTT: Antimicrobial agents in mollusks.

H. H. BOER: The effect of Amphiphenone B upon the egg production of *Lymnaea stagnalis* L.

W. J. VAN DER STEEN: Atmospheric pressure and egg production of *Lymnaea stagnalis* under laboratory conditions.

O. RAVERA: Effect of X-radiation in freshwater gastropods.

Section B (*Systematics, Zoogeography*)

R. TURNER: Consequences of a systematic revision of the *Teredinidae*.

N. HOLME: Distribution of mollusks in the English Channel.

P. E. P. NORTON: Marine mollusca in the lower Pleistocene of East Anglia.

A. V. GROSSU: The Caucasian elements in Central Europe, the *Lytopelt* genus (Gastropoda-Limacidae) in Rumania and a description of some new species.

H. ANT: Der Einfluss der Eiszeiten auf die recente Verbreitung der Landgastropoden Europas.

Lunch.

Excursion II b. Programme see II a, August 12th.

Excursion III b. Programme see III a, August 12th.

Excursion IV by bus to Isefjord Laboratory. Return by bus to Zoological Museum, where the excursion ended.

August 14th

Section C (*Structural physiology*)

C. R. STASEK: Form and symmetry in the bivalved mollusca.

M. PETITJEAN: Structure microscopique et nature mineralogique de la coquille des principaux *Muricidae* européens actuels et fossiles.

N. RUNHAM: The radula with reference particularly to electron microscope studies.

H. COOK: Structural details of the central nervous system of *Succinea putris*.

The excursions were among the highlights of the meetings and covered an interesting variety of places. The trip to Frederiksdal featured the site famous because of the activities of Johannes Müller there. Those who did not go to this area for land and freshwater collecting were able to go to the Marine Biological Laboratory at Helsingör or to the laboratory at Isefjord. The marine programs at these laboratories are well known throughout the world and a visit to these centers is most rewarding.

The meetings were formally concluded with a very enjoyable banquet in the "Akademisk Laererforsamlings Sal" at the Frue Plads of the University of Copenhagen. The hall is an historic one with large chairs and the atmosphere of the best in Danish academic life. The evening gave ample evidence that the Danes are among the finest of hosts and for all who attended the meetings there will always be an impression of warmth and cordiality which will go to make this second meeting a high in the affairs of the newly established society. The next meeting (3 years hence), will be held at the Museum of Natural History in Vienna, Austria.

NEWS, NOTES, NOTICES

The thirty-second annual meeting of the American Malacological Union will be held at the University of North Carolina at Chapel Hill, North Carolina, August 22-26, 1966. AMU members and their friends will be the guests of the North Carolina Shell Club whose members are already hard at work planning an outstanding meeting. Dormitory rooms will be available at exceptionally attractive rates; detailed information will be mailed to all AMU members in April.

On to North Carolina—the Scotch Bonnet State!

* * *

The nineteenth annual meeting of the Pacific Division of the American Malacological Union will be held for the first time in Seattle, Washington at the University of Washington, June 20-23, 1966. Anyone interested in malacology is invited. Notices will be mailed to members approximately April first; non-members of the AMU who wish to be notified as to accommodations when final arrangements have been completed are invited to send their name and address together with fifty cents to the AMU-PD secretary, Elsie Marshall, 2237 N.E. 175th St., Seattle, Washington 98155.

* * *

CITATION FOR DISTINGUISHED SERVICE

VICTOR L. LOOSANOFF

In recognition of more than thirty-one years of outstanding service in the field of marine biology and shellfisheries research with the Federal Government.

Dr. Loosanoff is recognized internationally as an outstanding authority in the field of shellfish research. He has devoted much of his life to a study of the physiology and ecology of commercially important shellfish and their associated animal communities. Through his intensive studies of oysters, clams, and mussels, his many publications, and his skillful direction of a research laboratory, he has made outstanding contributions to the knowledge of marine biology and shellfisheries research. His valuable contributions are presented in over one hundred sixty-nine papers, covering such aspects of shellfish research as reproduction, feeding habits, behavior, predator control, and artificial propagation. Major discoveries for the control of oyster predators and artificial culture of oysters and clams have been made by scientists under his direction. Several methods for control of drilling snails and starfish, major predators of commercial shellfish, are now in use by the shellfish industry and a chemical control method, conceived by Dr. Loosanoff, offers hope that the tremendous destruction caused by these predators can be greatly minimized. For research leadership, resulting in exceptional contributions to the scientific programs of the Bureau of Commercial Fisheries, Dr. Loosanoff is granted the highest honor of the Department of the Interior, its Distinguished Service Award.

(signed) Stewart L. Udall,
Secretary of the Interior

Members subject to the annoyance of paying annual dues are reminded that AMU life membership may be purchased for the equivalent of twenty years' annual assessment—\$60 as of the present date. Those presently holding paid life membership are: Dr. R. Tucker Abbott, Dr. Joshua L. Baily, Mrs. Horace B. Baker, Dorothy Brown, Mr. and Mrs. John Q. Burch, Mrs. Ruth Craine, Richard I. Johnson, Dr. David T. Jones, Dr. Joseph P. E. Morrison, Louis B. Mousley, Alfred J. Ostheimer III, Ruth E. M. Ostheimer, Dr. David H. Stansbery, and Dr. and Mrs. Henry van der Schalie.

* * *

It is no longer necessary to indicate on the original draft that reprints of abstracts are wanted. Authors will be furnished proofs of all papers submitted, together with an order form bearing printer's rates. This must be returned to the AMU secretary together with corrected proof within the time stipulated, usually ten days. Institutional purchase orders should accompany order form rather than being sent in advance to editor or secretary.

* * *

On display and receiving constant attention during the recent AMU meeting were two bulging scrapbooks, begun by former AMU secretary Imogene Robertson and continued by her successor. Since they contain programs, group and unposed pictures, and clippings of AMU meetings dating back to the first in 1931, these books may be considered as archives and grow in importance each year.

All pictures made during either of the two annual meetings are welcomed and will be credited to the donor as they take their places in this pictorial file of AMU history.

* * *

Each year the AMU secretary receives numerous letters from collectors in foreign countries expressing a desire to exchange shells with collectors in the United States. It has been the practice to pass such letters along to one or another of the AMU member shell clubs, trusting that some of the club members might be interested in establishing such an exchange.

This was at best a haphazard procedure and so it was with great interest that the secretary received the offer of the newest member club—the Pittsburgh Shell Club—that the group act as clearinghouse for foreign-American exchanges. In the future all letters from would-be exchangees in other countries will be forwarded directly to the Pittsburgh Shell Club. Persons desiring to exchange shells for those of Australia, New Zealand, Fiji, Africa, to name a few, should contact the Pittsburgh Shell Club, Section of Invertebrates, Carnegie Museum, 4400 Forbes Avenue, Pittsburgh, Pennsylvania 15213.

AMERICAN MALACOLOGICAL UNION MEMBER SHELL CLUBS

BOSTON MALACOLOGICAL CLUB, Barbara S. Crowley, Secretary: Eight monthly meetings are held at the Museum of Comparative Zoology in Cambridge, Massachusetts, October through May on the first Tuesday evening of each month. We welcomed 14 new members over the past year.

Officers for 1964-1965: President, Mrs. Kay Lawrence; Vice President, Dr. Kenneth Read; Secretary-Treasurer, Mrs. Barbara S. Crowley. Executive Committee, Miss Carol Ann Martin, Mr. Henry Cutler; Conchological Recorder, Miss Vida C. Kenk.

The following programs were presented this year: New England Marine Life, Colonel Eugene S. Clark; Collecting in Western Australia, Dr. Barry Wilson; Marine Collecting in the Western Atlantic Ocean, Dr. Kenneth Read; Shelling on the Gaspé Peninsula, Mrs. Bette Rachlin; Predators, Miss Carol Ann Martin; Marine Collecting in Madagascar, Dr. Arthur Humes; Mollusks of Chile, Señor José Stuardo; Marine Collecting in Malaysia, Thailand, and Indonesia, Dr. Joseph Rosewater; Collecting Misadventures in Nicaragua, Mr. Karl Jacobson.

Two extra meetings were held this year, one for our annual auction, the other our annual tour of the mollusk department at MCZ. Our June field trip to be held at Bass River on Cape Cod.

It is with great regret that we must record the passing of our fellow member, Mr. Richard W. Foster while on a tour in Italy, September, 1964. The club has presented a group of cabinets to the mollusk department of the museum in his memory.

BRAZORIA COUNTY (TEXAS) SHELL CLUB, gleaned from Vol. 1, number 1 of the club publication, Gifts from the Sea: The club holds alternate monthly meetings in Angleton and Lake Jackson, Texas on the third Tuesday of each month; time, 7:00 P.M.

Current officers: President, Joseph S. D'Amico, Secretary, Mrs. Robert Rast, Jr.

CONCHOLOGICAL SECTION, BUFFALO SOCIETY OF NATURAL SCIENCES, Eunice A. Potter, Secretary: We report on the activities of our 67th year!

Meetings at the Buffalo Museum of Science continued on the third Friday evening of each month save for March when we were snowed out. It has been an outstanding year in that more of our members than usual have had access to the sea; the Bearsses spent their vacation at Virginia Beach, the Bishops in Texas, the Peters on the Florida Keys, the Wandyez family in Florida, and the Potters in Maine.

At our annual banquet in October our speaker, Dr. Storr of the University of Buffalo, entertained with chalk artistry and film on his experiences in the Bermuda area; he wonders how and by what route the Queen Conch finds its way back to the mainland coast from a special spot in Bermuda waters. Another of his films made under the auspices of the Ford Foundation illustrated the havoc of pollution on certain Florida areas.

In November a bushel of dredgings shipped from the San Blas area was divided and scanned; many new specimens were discovered, miniatures in particular.

Officers elected in January were: President, Eugene Musial; Vice President, Diana Wandyez; Treasurer, Louise Becker; Secretary, Eunice Potter.

In March we were saddened by the death of one of our older and very loyal members, Mrs. Norma L. Ashbery.

Under the impetus of Morley and Ethel Bishop we decided to hold our first shell fair. The place was the Administration Building at the Methodist Home for Children in Williamsville, N.Y., where the hosts were Leslie and Eunice Potter. Local newspapers, TV, and radio stations cooperated with the publicity chairman, Hilda Peters, and the results amazed everyone; though a small show, the quality of artistic layouts and precise labeling was outstanding. Dr. Katherine Van Winkle Palmer of the Paleontological Research Institution of Ithaca, N.Y. judged our efforts and awarded gold ribbons to two outstanding entries; 300 registered guests were enthusiastic and it was voted then and there to hold another show in 1966.

CONNECTICUT VALLEY SHELL CLUB, Helen B. Burt, Secretary: Our club, organized in 1959, now has a membership of 39. We meet on the second Monday of each month at 7:30 P.M. in the lapidary room of the Science Museum, Springfield, Massachusetts. Officers are: President, Reverend Albert Kettell; Vice President, Earl H. Reed; Secretary, Helen B. Burt; Treasurer, Austin B. Warren.

Throughout the year our members enjoyed many splendid programs and excellent speakers. One of the highlights of the year was a joint meeting with the Connecticut Shell Club of New Haven to hear Dr. R. Tucker Abbott speak of "Popular Conchology." "Shelling on Bimini" was given by two new members, Wilfred and Hildur Wallesten. In August the club visited the Manse of Reverend Albert and Clara Kettell in Burlington, Connecticut; several attended the Sunday service in the Burlington Congregational Church to hear Rev. Kettell's sermon, "God's Wonders in the Sea." Henry and Nellie Dow titled their shelling trips "The Jamaica Way" and "Shelling on Grand Cayman" and Henry and Helen Burt presented via slides "Life in the Tide Pools" along the coast of Maine to New Hampshire. Slides taken on the Island of Swan on the coast of Nicaragua were shown by John Laban who as a weatherman has spent much time on islands of the Caribbean and the Pacific. Earl Reed gave lectures on several families of marine and fresh-water Mollusca.

Six of our members inadvertently chose the same area at the same time to shell, returned to tell us about "A Shelling Rendezvous on British Bimini"—the combined program of Henry and Nellie Dow, Percival and Dorothy Meyer, and Austin and Ruth Warren.

Other features of the year are shell displays, new books and publications, an annual picnic and field trip, a Christmas party, and presently all are looking forward to another Cape Cod field trip and visit to the biological laboratory of the Bureau of Commercial Fisheries at Woods Hole. It goes without saying, we are eagerly awaiting the coming year.

GARDEN STATE SHELL CLUB, Jane Zager, Secretary: Officers for the current year: President, Dr. Grace E. Eddison; Vice President, Nick Katsaras; Treasurer, Donald A. Diehl; Secretary, Jane Zager.

Most of our programs originate with our members; we have enjoyed "Classification of the Family Volutidae," Dr. Eddison; "Schistosomiasis," Harry G. Lee; "Collecting in the Gulf of Oman, S.E. Arabia," Dr. Donald Bosch; "Color Slides of World Wide Shells," Nick Katsaras; "Collecting Around the Pacific," Alice Windsor; "Bermuda Collecting," Russell Jensen; "World Wide Limpets," William E. Old; "Collecting in Puerto Rico," Harry G. Lee; "Skin Diving Results at Water Isle," Dr. Eddison; "Mexican Shelling," Mr. and Mrs. John Germer.

Monthly meetings (September through June) are held on the first Sunday, 2:00 P.M. at the Irvington State Bank, 918 Springfield Avenue, Irvington, New Jersey. Visitors are most cordially welcome.

HAWAIIAN MALACOLOGICAL SOCIETY: (1965) President, Ellis Cross; Vice President, Charles Boerner; Treasurer, Bill Christensen; Corresponding Secretaries, Mr. and Mrs. Neal Seamon; Recording Secretary, Miss Pat McGuire; Editor, Hawaiian Shell News, Clifton Weaver.

The Hawaiian Malacological Society meets the first Wednesday of each month at 7:30 P.M. at the Waikiki Aquarium. The Junior Shell Club, sponsored by the HMS, meets at the Children's Museum, Ala Moana Park at 7:30 P.M. on the first and third Friday of each month; visitors are welcome to both club meetings.

The 1965 Hawaiian Shell Fair is planned for November 6-15, inclusive.

JACKSONVILLE SHELL CLUB, Leola R. Stephens, Corresponding Secretary: The Club meets on the fourth Thursday of each month, September through May, 8:00 P.M. at the Arlington Federal Savings and Loan Association, 930 University Building in Jacksonville, Florida. Visitors are welcome.

Officers for 1965: President, R. A. Melton; Vice President, Louis Curen; Recording Secretary, Harry Webb; Corresponding Secretary, Leola R. Stephens; Treasurer, Russell See.

Program highlights of the year were as follows: movies of the Jacksonville shell show; report on the annual meeting of the American Malacological Union, Gertrude Moller; a slide presentation of Atlantic and Gulf Coast flowers and mushrooms; shell exchange night; annual Christmas party; Show and Tell meeting; The Life of the Sea and Mollusks (films); Shelling in Hawaii, Mrs. Russell G. See; The Birth of the Keys (film); Library Night, introducing members to club-owned books.

The 1965 shell show is scheduled for July 30-August 1 at the Garden Club of Jacksonville Auditorium.

NAPLES (FLORIDA) SHELL CLUB, Lucille Messmer, Secretary: Our club enjoyed a most successful year. We meet on the third Thursday of each month, October through May at 8:00 P.M. in the Community Room of the Naples Federal Savings and Loan Association. Visitors are always welcome.

We have interesting programs with invited speakers from around the state

and sometimes from the North; usually these talks are accompanied by slides and films.

Periodically the club stages trips to rarely shelled islands and beaches; these excursions are called Shell-Faris. Boats, and if necessary, guides are hired on a collective basis. Each member brings equipment, food, and drink. The range is practically unlimited since we have ten thousand islands to choose from! One Shell-Fari to Cape Romano was attended by 64 members plus a few guests, this in spite of the fact that our members are on the whole not young people, and the trip entailed a boat ride through uncharted waters. Shell-Faris are popular with us.

Other activities include sponsorship of live aquaria in local high schools; we furnish equipment and help finance field study trips. All live aquaria are displayed at the local shell show. We furnish books on malacology to the county library, also display shells there.

Much activity goes into preparation for the annual shell show; the 1965 show attracted 5,300 visitors, remarkable since there are but 7,000 year-round residents in our city. Chief judge was Dr. R. Tucker Abbott, and our club was honored in that the Philadelphia Academy of Sciences Award was bestowed on one of the entries (live shells).

A committee of 32 members staged this show and displays were entered by shells from many parts of Florida and by some northern malacologists; outstanding was an entry of fossil shells, notable for being larger than their Recent counterparts. Shellcraft entries are popular and for the first time we had a separate classification for students.

Our officers: President, Edward Foster; Vice President, Helen Erday; Secretary, Lucille Messmer; Corresponding Secretary, Dorothy LaCelle; Treasurer, J. Richey Horner.

NATIONAL CAPITAL SHELL CLUB, Mrs. Olive M. Lewis, Secretary: The National Capital Shell Club began its fifth year's activities with Dr. Joseph Rosewater as President; Mr. Norman S. Meese, Vice President; Mrs. Olive M. Lewis, Secretary; Mrs. George C. Rickard, Treasurer; and Capt. and Mrs. Carl I. Aslakson, Members-at-Large. Meetings are usually held on the fourth Thursday from September through May at 8:15 P.M. in Room 43 of the Museum of Natural History, 10th and Constitution Avenue, N.W., Washington, D.C.

The programs for the 1964-1965 year included: "Shelling in the Florida Keys 1964" by Mr. Norman Meese; "Early Mollusks" by Dr. Ellis Yochelson; "Scuba Diving for Shells in the Gulf of Mexico" by Maj. Dwain Colby; "Collecting Mollusks in the Waters of Malaysia, Thailand, and Indonesia aboard the 'Te Vega,' Cruise 'A,' International Indian Ocean Expedition, 1963" by Dr. Joseph Rosewater; "Some Shells of the Virgin Islands" by Dr. Joseph Morrison; "Conchology—Queen of the Natural Sciences" by Dr. R. Tucker Abbott; "Shells and Shelling in the Mariana Islands" by Mr. Norman Meese, and a panel and open discussion on "Shell Collecting Methods." All of the talks included color slides or movies. A field trip was made to the Biological Laboratory of the Fish & Wildlife Service, Oxford, Md. in October.

In January a Shell Auction was held to raise money for a scholarship for graduate study in marine biology, preferably in malacology. An award of

\$150.00 was made to Mr. George E. Radwin who is working on his Ph.D. on mollusks at George Washington University.

The officers for the coming year are President, Cmdr. Wesley M. Thorrrson; Vice President, Mr. Norman S. Meese; Recording Secretary, Mrs. A. I. Valieres; Corresponding Secretary, Mrs. Darrell E. Mackiernan; and Historian, Mrs. Bessie White.

THE NEW YORK SHELL CLUB, INC., Dorothy Raeihle, Editor N.Y.S.C.N.: Our club concluded a most successful and instructive 1964-1965 season with their hosting of the 31st Annual Meeting of the American Malacological Union. We were honored to have the meeting in New York and appreciate the generosity of the Staten Island Institute of Arts and Sciences in co-hosting the meeting.

Our monthly meetings were as busy, comparatively, as those four days at Staten Island. During the past year, Dr. William J. Clench visited and gave us as thorough a grounding as is possible in one session on "Some Factors in the Ecology of the Mollusca." Dr. William K. Emerson's "Distribution of Littoral Molluscan Faunas of Baja California" gave us insight and understanding of the study of fossil and Recent fauna. Dr. Barry Wilson, of the Perth Museum, told us of "Shell Collecting in Western Australia." Arthur Merrill, of U.S. Fish and Wildlife, described studies being made of local fauna in his presentation "Biological Use of Organisms Collected from Navigation Buoys." His was an excellent illustration of how much is available for study in the local fauna. Dr. Bernard Tursch, of Belgium, was an unexpected and welcome guest, telling of his work along the coast of Brazil, a scarcely collected area. Dr. Josef Vagvolgyi, of Brooklyn College, lectured on "Adaptation in Mollusks," using *Cepea* as an example.

Of our "home-grown talent," M. K. Jacobson gave lectures on Mollusca; Harold Feinberg gave a comprehensive talk on "The American Naiads"; several other members gave slide-illustrated talks on their shelling in California, Central America, Eleuthera, Scotland, and Arabia as well as Florida and nearby areas. The "Shell-of-the-Month" and other presentations included studies both conchological and malacological.

Our club had two official outings this year: One to Croton Point Park for land and freshwater species, and one to Orient Beach State Park for marine species. Both were successful, each location yielding a variety of living mollusks.

The "New York Shell Club Notes," the oldest of current publications by shell clubs, is sent out 10 times a year to approximately 250 members, both regular and corresponding. It is a mimeographed paper (usually of at least eight pages) containing studies, reports, and reviews.

Plans for next season include a shell sale and party to be held April 17, 1966. We are indebted to Miss Mabel Bender, until recently of Walden, New York, for the donation of her fine collection of shells through which we will be able to enrich both our club library and our private collections.

New York Shell Club meetings are held on the second Sunday of each month, September through June, at 2:00 P.M. in Room 319 of the American Museum of Natural History. An exception to the schedule will be made in April of 1966 when our shell sale will be held elsewhere.

Current officers: President, George Raeihle; Vice President, Mansfield C.

Fuldner; Recording Secretary, Milton Werner, Jr.; Corresponding Secretary, Grace McDougall; Treasurer, Mathilde P. Weingartner; Historian, Nick Katsaras; Librarian, Selma Feinberg.

NORTH CAROLINA SHELL CLUB, Hugh J. Porter, Secretary: Membership in this organization, which includes persons from all parts of North Carolina and some from neighboring states, particularly the coastal area of South Carolina, continues to number about 225 junior and senior members. The four meetings each year are in March, May, October, and December. By tradition three meetings are held on the coast and the December meeting is held inland. Coastal meetings include Friday and Saturday evening get-togethers, a Saturday field trip, and a general meeting sometime Saturday depending upon when the tide is wrong for collecting. Inland meetings so far have included only a Saturday morning get-together and an afternoon general meeting. During get-togethers, members are encouraged to exhibit their shell collections, particularly those parts pertaining to the group of shells emphasized during the meeting. Much bartering and selling of shells also goes on. Shell door prizes are awarded frequently. Attendance at meetings usually runs about 50 or more persons.

In October the club met at Kure's Beach, N.C. with the meeting emphasis on the Tonnacea and the Cardacea. For the field trip beach buggies were hired to take members to the more inaccessible parts of the beach. The December meeting was held at High Point College in High Point, N.C. Morning and afternoon session speakers were: Mrs. Dorothy Beetle who talked on shell collecting in Wyoming, Dr. Charlotte Dawley who talked on the freshwater Mollusca of North Carolina, and Dr. Halsey Miller who talked on fossil shell collecting in western U.S.A. March found the club meeting in Myrtle Beach, S.C. This time Volutacea was the group studied. Discussions during both the October and March meetings were led by Dr. John Ferguson. Field trips were made to Litchfield Beach and Pauley's Island in spite of bad weather. May's meeting was at Atlantic Beach, N.C. Club projects took up most of the informal and formal meetings. The field trip was participated in by thirty-nine persons who went by chartered shrimp boat to Cape Lookout.

Several projects dominated club activities during the year. A second bulletin was published. A committee was formed to rework and start building up the mollusk collection at the State Museum of Natural History in Raleigh. This was done in memory of the late Mrs. Lula Upchurch. The project which stirred up most interest was the attempt by the club to get the Scotch Bonnet, *Phalium granulatum* Born, by legislative action to be made the state shell of North Carolina. The bill for this passed in late May but not before the legislators and the state press had a good time with the bill.

The 1965 officers are: President, Mr. Paul Jennewein; Vice President, Mrs. H. M. Bertling; Treasurer, Mrs. E. T. Kathews; Secretary, Mr. Hugh J. Porter; Members of the Executive Committee, Mr. Harry T. Davis and Mr. Carl C. Withrow.

NORTHERN CALIFORNIA MALACOOLOGICAL CLUB, Kay Gudnason, Recording Secretary: We meet in Room 4005 of the Life Sciences Building

on the University of California campus in Berkeley, 8:00 P.M. on the first Tuesday of each month. Those wishing to display, exchange, or identify shells should come at 7:30 and visitors are always most welcome.

Our present membership is 60 and the following are officers for 1965: President, Frank Carus; Vice President, Salle Snyder; Membership Secretary, Laura Burghardt; Corresponding Secretary, Verna Wegner; Recording Secretary, Kay Gudnason; Treasurer, Doris Lewis; Director-at-Large, Dr. Cadet Hand; Advisor, Dr. Rudolf Stohler.

A new feature of this year's program is the establishment of special interest groups; these are not only of constructive benefit to members but serve also as a reservoir of club material. These groups were set up as starters: Taxonomy, Nomenclature; California Shells; Photography; *Chitons*.

It is worthy of note that there are so many capable speakers among our members that it has not been necessary to turn to outside sources for most of our programs. Allyn G. Smith showed various types of photographic equipment with examples of the photographs produced in his excellent talk "How to Photograph Sea Life." Robert Ames gave a beautifully illustrated lecture on "Marine Invertebrates of the Point Lobos Area." The Christmas banquet was held at the Alameda Naval Air Station Officers Club and Virgil Herring showed many examples of his superb photography. Other club members, Gladys Archerd, Hazel Jeschien, and Frank Russ, have given informal talks about the shells in which they specialize. Dr. Victor Loosenoff, Director of the Bureau of Fisheries, presented a most interesting and informative lecture on oyster culture in France.

On the weekend of May first thirty members made a field trip to Bodega Bay though the wind was strong and the tide high. Dr. Cadet Hand gave a personally conducted tour of the new University of California marine station site.

PACIFIC NORTHWEST SHELL CLUB, Ann Smiley, Secretary: In November, our club ends its fifth year, with a total of 136 members. Five years ago our first regular meeting was held with 35 charter members.

Many interesting programs during the past year have included a talk by Dr. Ray of the Pacific Science Center on her experiences with the Indian Ocean Expedition, a program on water pollution which is a subject that greatly concerns us all, films on marine subjects, and slides on an Australian collecting trip.

On June 20th a picnic was held at Dosewallips State Park on Hood's Canal, followed by a tour of the Washington State Shellfish laboratory at Point Whitney.

We all look forward to our annual picnic and shell auction on July 18th at the Wheeler home in Seattle. The auction enables members to add some nice shells to their collections, with the climax of the day being the privilege of viewing Mrs. Wheeler's beautiful collection.

Some of our members have sent shells to the Italian Boy Scouts, and the club has donated a copy of Dr. Abbott's "American Sea Shells" to the Pacific Science Center library.

Our 1965 officers are Tom Rice, President; Gerald Ward, Vice President; Ann Smiley, Corresponding Secretary; Helen McHood, Recording Secretary; Clarice Lynn, Treasurer. Meetings are held on the third Sunday of each

month, alternating between the Pacific Science Center at Seattle and the Point Defiance Aquarium at Tacoma, with the exception of June and July. Meetings are open to anyone interested and if you expect to visit our area we suggest that you get in touch with one of our members, who will be glad to give you any information and assistance possible.

PACIFIC SHELL CLUB, Martha Dippell, President: The Pacific Shell Club meets at 2 o'clock on the afternoon of the Sunday preceding the first Monday of every month from October through June. It is sponsored by Mr. George Kanakoff, curator, Department of Paleontology, Invertebrates, and Mr. James McLean, newly appointed curator of the Department of Invertebrate Zoology, Los Angeles County Museum. Visitors are welcome.

Our rapport with the museum implies faithfulness to our educational function, and this year's program has been outstanding in this respect. Rose Burch's notably well thought-out and carefully prepared year-long emphasis on "Getting to Know our Own Shells" has fulfilled a long-felt want and need. Correlated to this topic were short talks by members, under the direction of Crawford Cate; and, when possible, field trips, guided by Jean Wilkins, usually one a month. As always, some of us made additional forays into Mexico—Guaymas, La Paz, Cholla Bay, Puertocitas, Buena Vista, etc.

Our second most important piece of work was the adoption of the constitution drawn up by a committee, Robert Howley, Chairman.

Other accomplishments: truly wonderful loose-leaf yearbooks (membership rosters) created by Erva Barber; also, by Erva, guest cards with all necessary information about the Pacific Shell Club, to be handed out wherever and whenever needed. Some of our best people have been recruited straight from tide-pool encounters this way! Also, since December, stickers on our car windshields bearing the club insignia—the attractive, greatly appreciated gift of Mr. Orval Blake. Twila Bratcher's shell-braille property erroneously attributed to another club, is still our very own favorite on-going activity. The boxes of shells have been pretty well distributed to California schools for the blind—and some, further—even to Europe.

Yes, we have fun, too! The new pecten-shaped paper guest-tags produced by Grace Forbes and her committee have made it easier for old and new members to get acquainted, and our traditional Christmas party and annual picnic, with the hospitable assistance of Betty Hill, are all the better.

Finally, our shell auctions, under the inimitable auctioneership of Mr. John Q. Burch, have been successful to the point of hilarity. Our roster of hard-working officers for 1964–1965 are: President, Martha Dippell; Vice President, Rose Burch; Recording Secretary, Essye Epstein; Corresponding Secretary, Helen Shimota; Treasurer, Isaac Cowgill; Editor, Robert Howley.

PALM BEACH COUNTY SHELL CLUB, Mrs. Ward Brown, Past President: The past year, April 1964–April 1965 was the most momentous year in the annals of the Palm Beach County Shell Club. In June the club was incorporated and received the charter from the State of Florida. Over the months we were privileged to hear Dr. Clench of Harvard University speak on freshwater Mollusca, Dr. Gilbert Voss of the University of Miami on Cephalopoda (he is a recognized authority on the family) and Dr. Sheldon

Dobkin of Florida Atlantic University whose subject was Perspective in Oceanography.

The February shell show, an annual event, was financially the most successful ever held. Judges were Dr. Voss, Dr. Ted Bayer, and Dr. Donald Moore, all of the University of Miami. Proceeds from these shows are set aside and this year the club offered its first scholarship in the amount of \$500 to a graduate student in the field of malacology in the State of Florida. Mrs. Richard Lee, long-time editor of the club publication *Seafari* is Chairman of the Committee, on which Mrs. Guy Phelps, a founder of the club, also serves. Dr. Clench and Dr. Voss are the judges and a winner will be announced in the near future.

THE PHILADELPHIA SHELL CLUB, Freda S. Knauer, Corresponding Secretary-Treasurer: Meetings are held the second Thursday of each month, September through May, at 8 P.M. at the Academy of Natural Sciences, 19th Street and the Parkway, Philadelphia, Pennsylvania. Visitors are always welcome.

Officers elected for 1965-1966: Honorary Life President, Dr. H. B. Baker; President, Ronald D. Lowden, Jr; Vice President, Ruth E. M. Ostheimer; Corresponding Secretary-Treasurer, Freda S. Knauer (925 Collenbrook Ave., Drexel Hill, Pennsylvania 19026); Recording Secretary, Patricia D. Henkels; Historian and Editor, Dr. R. Tucker Abbott; Councillors, Dr. Wm. E. Dodd, Dugalda M. Wolfson, Gilbert F. Quinby and past presidents.

The 10th year of The Philadelphia Shell Club has been a most active and interesting one for its 224 members. Programs, with the exception of "Shell Collecting in Western Australia" by Dr. Barry Wilson, were presented by some of our most avid shell-collecting members: "Grenada, Isle of Spice—and Mollusks" was the subject of an illustrated talk given by Dr. Minerva Buerk and Ruth Ostheimer; "New Jersey, Shelling Paradise" by Ronald Lowden; "Collecting Mollusks in Southern India" by Dr. Robert Robertson; "Popular Conchology" by Dr. R. Tucker Abbott. Our September meeting was devoted to a member-participation program in which many accounts of summer collecting experiences were given and enjoyed by all members. December, as always, was our Christmas meeting, at which time the main feature was the presentation of "The Restless Sea," a fascinating color film produced by Walt Disney for the Bell Telephone System. Delicious refreshments served by Mrs. Meyer Naide's able Committee and an enjoyable social period followed.

Monthly programs also included a non-competitive exhibit of collections by and for members; and to climax the season, a "fun" auction, which netted the Club \$261.50. Reports were given by Dr. Abbott on the July 1964 AMU Meeting in New Orleans and on the 1965 Florida and Texas Shell Shows which he had judged.

Dr. Robertson's most informative "Classes on Mollusca" were continued covering Opisthobranchs, Scaphopoda, and Pelecypoda. Dr. Baker also completed his discourse on "Land Mollusks."

PITTSBURGH SHELL CLUB, June Snyder, Secretary: At our October, 1965 meeting, the following officers were elected for a two-year term: Presi-

dent, Mrs. Gladys McCallum; Vice President, Norman Franke; Secretary of Records, Sharon Snyder; Secretary of Correspondence, Mrs. June Snyder; Treasurer, Mrs. Esther Parodiz; Councillor, Dr. Juan J. Parodiz.

On Saturday, March 27, 1965, thirteen persons interested in malacology and shell collecting met at Carnegie Museum under the guidance of Mrs. Gladys McCallum, former Secretary-Treasurer of the Boston Malacological Club, and Dr. Juan J. Parodiz, Curator of Invertebrates at Carnegie Museum and President of the American Malacological Union. It was decided then that the organization shall be known as the **PITTSBURGH SHELL CLUB**. Meetings are held once each month at the Carnegie Museum, except during the summer. Talks presented thus far have been on "Collecting in New England," "Sea Shells by the Sea Shore," and "300 million Years of Shell Collecting." Instructive notes, regularly prepared by Dr. Parodiz, are distributed and discussed and following the formal meeting refreshments have been served by volunteer hosts.

Nine of the Pittsburgh Shell Club members attended the AMU annual meeting at Staten Island, New York, in July.

The first field trip for collecting freshwater mollusks took place in September at Buffalo Creek in the vicinity of Freeport, Pa. Future field trips of this kind will help to determine the effects of industrial stream pollution on the fresh-water molluscan population of western Pennsylvania. No major work on this subject has been done in this area since Ortmann's studies half a century ago.

In its few months of existence the Club membership has increased to 29, including one corresponding member.

ROCHESTER SHELL AND SHORE CLUB, Marjorie Brenneman, Secretary: Our membership has grown from a nucleus of 8 to 40 active members, many of whom spend much time collecting in Florida and elsewhere. Mr. Porreca, one of our members, visited Hawaii and reported to the club on activities there, distributing shell and coral samples. Club members are invited to the home of Dr. Wightman to make use of his shell library, and the same courtesy has been extended by the Buffalo Museum of Science.

Many of our members have had exhibits placed in libraries and schools, and have also enjoyed giving lectures to various educational groups around our city of Rochester, New York. Two members won ribbons as awards for their shell exhibits. A theater party of 54 was organized to view the film, "World Without Sun."

Our club library is small, but growing; the most recent additions being "The Van Nostrand Catalog," donated by Mrs. Marion Drake and "Helpful Hints for Shell Hunters," the gift of Mr. Porreca.

Officers for 1965-1966: President, Berniece Plummer; Vice President, Elinor Abendroth; Treasurer, James Barton; Secretary, Marjorie Brenneman; Librarian, Doris Barton; Conchology Consultant, Dr. Eugene Wightman.

ST. PETERSBURG SHELL CLUB, Marilyn S. Gordon, Corresponding Secretary: The club held its meetings at the Florida Presbyterian College in St. Petersburg, Florida on the second and fourth Friday of each month (October through April) and enjoyed the following Programs:

"Shelling in Bimini," Irma Sehner; "My Friends in the Sea," Cricket Harris,

curator of the Sea-O-Rama at Clearwater, Florida; "The Salt Water Aquarium," Patricia Torrance and Mary D'Aiuto; "Molecules and Starfish," Dr. John C. Ferguson, Florida Presbyterian College; "Sea Shell Animals" and "Seashore Life," sound and color films; Christmas party and shell exchange; "Preparation for Shell Showing," Dorothy Hanssler; "Finding Florida Fossil Shells," Major George D. Robinson; "Marine Ecology," a film; "Marine Ecology," Dr. William J. Clench, Museum of Comparative Zoology, Harvard University; "Some Important Old Shell Books," V. Roger Dunn; "Shell Art," Barbara Steger; "Echoes of the Shell Show," Dan Steger.

At each meeting, in addition to the above features, color slides of shells were shown by Dan Steger. The last two meetings of the season were in the form of a picnic for the members hosted by the Historical Society of St. Petersburg and the annual picnic at Fort de Soto Park

Nine field trips were held at six locations; attendance was very good and several out-of-state visitors accompanied us on these outings.

The 18th Annual Shell Show was held at the new Bayfront Center in St. Petersburg, March 24-28, 1965. Judges were Dr. Harald Rehder, Dr. Donald Moore, and Dr. Donald Weisbord. Winner of the Smithsonian Institution Award was V. Roger Dunn with his display of "Cones of the World." Ribbons in 13 other categories were also awarded.

SAN ANTONIO SHELL CLUB, Mrs. R. Thacher Gary, President: Our club is in its tenth year with eleven charter members still active. We have 42 active members, 9 junior members, 22 who are corresponding members, and 7 institutional members on our mailing list. Over the past year our club has presented honorary memberships to Dr. Thomas E. Pulley, Dr. R. Tucker Abbott, and Dr. William J. Clench.

Elected officers: President, Mrs. R. Thacher Gary; Vice President, Mrs. Louis Goethel; Secretary, Mrs. Renford Taylor; Treasurer, Mrs. John Bayne. Appointed officers: Historian, Mrs. John Bayne; Hostess, Mrs. Alyce Grossman; Librarian, Dr. Thacher Gary; Editor *Texas Shell News*, Mrs. Laura Gilbert.

Meetings on the fourth Monday of each month at 8:00 P.M. at Asbury Methodist Church, San Pedro Ave., San Antonio (except July and December when meetings are held in members' homes).

To study shell-show methods twelve members attended the South Padre Shell Fair, returning with thirteen ribbons including the Shell of the Show Award! Weekend field trips include collecting marine, freshwater, and fossil shells.

Programs are scheduled on an annual basis and published in an attractive yearbook; emphasis is on increased knowledge of mollusks, their collection and preservation along with the whys and wherefores of taxonomy. The club constitution was revised and the Northwest Pacific Shell Club's "Code of Ethics for Shell Collectors" was adopted.

For the fifth year the club has exhibited shells at the Fort Sam Houston Annual Hobby Show. Study displays of shells for school use have been prepared as well as a box of Texas coast shells for Italian Boy Scouts.

Finally, we are continuing to add shell books and pamphlets to the club library for the use of members. Our club publication, *Texas Shell News*, is published quarterly.

SANIBEL-CAPTIVA SHELL CLUB, Mrs. Harvey Meyer, President: The annual Shell show was held on March 4th, 5th, and 6th and although the weather could have been better, there were over three thousand visitors, comprising not only representatives from all fifty of the United States, but also visitors from Canada, Germany, France, and Mexico. The exhibits showed great effort, care, and unusual discrimination.

The school exhibits, covering only the 1st and 6th grades were considered by Dr. R. Tucker Abbott the best he had ever seen in content as well as numbers. It was especially gratifying to have some of the winners of the Beginners Class of last year, carry off ribbons again this year.

This year the Sanibel Community Association instituted three new prizes to encourage the collection of our island shells. One is for children, one for beginners, and the third for Old Timers. This last award is a perpetual cup, with a replica for the current winner.

The annual shell count was extended to three days this year, but the total count was no more than the usual one-day count.

At the Christmas party, which is always a gay affair, the exchange of shells is a great feature.

Mr. Dan Steger, Tampa, lectured on the shells of Tampa Bay and the Gulf of Mexico with excellent documentation and he also showed a choice selection of slides from Dr. Alsaker's famous collection of Volutes.

Dr. Eugene Wightman showed a number of fine slides from several museums and private collections and also slides of our island shells.

Mrs. William Stevenson gave an amusing as well as informative talk on the shells she had collected while her husband was ambassador to the Philippines.

At the meeting of the American Malacological Union in New Orleans, Dr. and Mrs. Harvey Meyer, at very short notice, organized a most satisfactory Shell Night.

In addition to the usual activities of the club, we were privileged to work with the editors of the *Readers Digest* on the excellent article "Jewels from the Deep" by Murray Hoyt in the May issue.

The Rolling Showcase of Florida Shells is still one of our projects, but our paramount concern is the conservation of our living shells.

Too many eager shellers, through thoughtlessness or ignorance take more shells than they need for their collections. We are making every effort to interest state and federal authorities in this very vital conservation. We also continue to distribute our shell handbook "Conservation, Collecting, Cleaning," which may be obtained from the Sanibel-Captiva Shell Club.

Our officers for the coming year are: President, Mrs. Harvey Meyer, Captiva; 1st Vice President, Mr. Arthur Burt, Sanibel; 2nd Vice President, Mrs. E. T. Adler, Captiva; Treasurer, Mrs. Arthur Swanson, Sanibel; Recording Secretary, Mrs. H. K. Jeremiassen, Captiva; Corresponding Secretary, Mrs. M. C. Pevear.

Meetings are held on the third Monday evening of each month from November through April, alternating between Sanibel and Captiva.

SOUTH FLORIDA SHELL CLUB: Our meetings are held at 8:00 P.M. on the fourth of each month at the Museum of Science and Natural History in Miami.

Over the past year we were provided with programs by guest speakers among whom were Mrs. M. (Ann) Valentine, Lowell Thomas, Robert Work, rangers from the John Pennekamp Coral Reef State Park, Mrs. Elva D. Sheets, Dr. Walter A. Starck II, and our members who gave "Shell of the Month" talks.

In November, 1964 we initiated our first annual shell bazaar; we invited other Florida shell clubs to participate and all attending had a grand get-together. Local dealers generously donated door prizes.

We had a shell booth at the Museum's "Around the World Fair" and proceeds from the sale of shells were given to the Museum. Our own treasury has been helped by our monthly shell raffle, a feature of each meeting.

Field trips were made to Marco Island, Bimini, Cat Cay, Bear Cut in Miami, and into the Everglades for *Liguus*.

At both the Naples Shell Show and our own show Mrs. Lawrence Crovo was awarded the Academy of Natural Sciences of Philadelphia award for her Cypracidae entry; in 1964 Mr. and Mrs. H. Brown Sturgeon won the same award at the Sanibel-Captiva show for their display of Pectinidae and again at Jacksonville for their entry of shells from the Florida Keys. We are very proud of them.

The South Florida Shell Club awarded ribbons at the South Florida Science Fair to students at local high schools; our finest future members will be these interested students.

We are very fortunate to receive assistance from the scientists at the Institute of Marine Science; they are always gracious and helpful.

Officers for 1965-1966: President, Gloria Durfey; Vice President, Donald Franks; Recording Secretary, Evelyn Lewis; Corresponding Secretary, Eleanor Leeman; Historian, George Anna Carter; Editor, John A. Baker; Past President, Norris McElya, Jr.

YUCAIPA (CALIFORNIA) SHELL CLUB, Stella Barron, President: We meet on the third Sunday of each month, 2:30 P.M. at the Mousley Museum in Yucaipa.

Among the outstanding speakers we have been privileged to hear were Dr. S. Stillman Berry, Dr. Myra Keen, Mr. John Fitch, Miss Frances Cramer, and Jean and Crawford Cate. Shells were on exhibition at each meeting and the speakers presented slides and movies to illustrate their talks. We have had but one field trip.

Officers for 1965: President, Stella Barron; Vice President, Louis Mousley; Secretary, Ruth Newby, Treasurer, Ervin Wahrenbrock; Program Chairman, Eva Maye Fletcher.

* * *

Other shell clubs affiliated with the American Malacological Union are the Broward Shell Club (Fort Lauderdale, Florida), Chicago Shell Club, Coastal Bend Shell Club (Corpus Christi, Texas), Conchological Club of Southern California (Los Angeles), Connecticut Shell Club (New Haven), Greater St. Louis Shell Club, Gulf Coast Shell Club (Texas), Kauai Shell Club (Hawaii), Kwajalein Malacological Society (Marshall Islands), Long Beach (California) Shell Club, Sacramento Valley (California) Shell Club,

San Diego Shell Club, Santa Barbara Malacological Society (California), Shell Club of the Ryukyu Islands (Okinawa), and South Carolina Shell Club.

A complete listing of all shell clubs together with their addresses (including several foreign clubs not affiliated) may be obtained by writing to the AMU secretary, Box 318, Route 2, Marinette, Wisconsin.

* * *

IN MEMORIAM

Mrs. Eliot Armstrong
Mrs. Wallace H. Ashbery
Mrs. Joshua L. Baily
Mrs. Howard L. Fletcher
H. Theodore Foley
Frank Knight Hadley
Mrs. H. Taylor Raines

ACTIVE MEMBERS

Membership List Revised November 30, 1965

* Pacific Division member

- Abbott, Dr. R. Tucker, Dept. of Mollusks, The Academy of Natural Sciences of Philadelphia, 19th and The Parkway, Philadelphia, Penn. 19103.
- *Abel, Richard and Co., P.O. Box 5357, Portland, Ore. 97206.
- Adams, Lawson, 2100 S. Bay St., Milwaukee, Wisc. 53207. (Amateur.)
- Aguayo, Dr. Carlos G., College of Agriculture, Mayaguez, Puerto Rico 00709.
- *Albert, Mrs. Ernest, U. S. Army Eng., G. P. Bldg. & Grnds., APO 331, San Francisco, Calif. 94101.
- Alexander, Robt. C., 423 Warwick Rd., Wynnewood, Penn. 19096.
- Allen, Dr. J. Frances, 5416 Kenilworth Ave., Riverside, Md. 20840.
- Allen, Miss Letha S., 187 Argyle St., Yarmouth, Nova Scotia, Canada. (Mollusks in general.)
- *Allison, Dr. Edwin C., 1420 Henry St., Berkeley, Calif. 94709. (Fossil, Recent & mega-micro marine invertebrates.)
- American Association for the Advancement of Science, 1515 Massachusetts Ave., Washington, D. C. 20505.
- Anderson, Miss Edna L., c/o Helen Notter, 2529 Gilmore St., Jacksonville, Fla. 32204.
- Anderson, Miss Katherine M., Box 206, Chillicothe, Ohio 45601. (*Pecten*, *Murex*.)
- *Arnold, Ben E., Rt. 5, Box 27, Port Orchard, Wash. 98366. (Tropical and semi-tropical marines.)
- Aslakson, Capt. and Mrs. C., 5707 Wilson Lane, Bethesda, Md. 20034. (World marine shells.)
- Athearn, Herbert D., Rt. 5, Box 376, Cleveland, Tenn. 37311. (Freshwater mollusks.)
- Athearn, Mrs. Roy C., 5105 N. Main St., Fall River, Mass. 02720. (Land shells.)
- Atwater, Rev. David T., 50 Grace Court, Brooklyn, N. Y. 11201.
- Auerbach, Stuart, 1710 Algonquin Trail, Maitland, Fla.
- *Avery, Mrs. Rada Gail, 1823 N. 40th St., Phoenix, Ariz. 85008. (Shells of N. America; exch.)
- *Baily, Dr. Joshua L., P.O. Box 1891, La Jolla, Calif. 92038.
- Baker, Emmett B., 7 Riverview Ave., Kingston, Mass. 02364. (General interest.)
- *Baker, E. P., 11619 Downey Ave., Downey, Calif. 90241. (Pacific Coast shells; exch.)
- Baker, Dr. and Mrs. Horace B., 11 Cheltenham Rd., Havertown, Penn. 19083.
- Baker, John A., P.O. Box 171, Biscayne Annex, Miami, Fla. 33152. (General interest.)
- *Baker, Nelson W., 279 Sherwood Dr., Santa Barbara, Calif. 93105. (General interest.)
- Baker, Wm. R., 612 Mississippi Ave., Ferriday, La. 71334
- Barbosa, Frederico Simoes, Caixa Postal 1626, Recife, Pernambuco, Brazil. (Freshwater shells.)
- *Barron, Stella, 322 Nordina St., Redlands, Calif. 92373.
- Bauer, Edgar, Daniel Carrion 249, Miraflores, Lima, Peru.
- Bayer, Frederick M., Marine Lab., Univ. of Fla., 1 Rickenbacker Causeway, Miami, Fla. 33149.
- Beaudry, Herbert L., Calle San Pedro # 7, P.O. Box 728, Mayaguez, Puerto Rico 00709. (Shells, their history and preservation.)

- Beaven, Dr. and Mrs. J. Mahlon, 175 W. Ridgewood Ave., Ridgewood, N. J. 07450.
(Amateurs; beautiful shells.)
- Becker, Mr. and Mrs. Albert F., 2157 Sunrise Dr., La Cross, Wisc. 54602. (Mississippi River shells.)
- Becker, Miss Louise W., 2 Lexington Ave., Buffalo, N. Y. 14222.
- Bedell, Adele Koto, 2643 Laundale Dr., Beloit, Wisc. 53511.
- Bedford, Charles A., Gen. Del., Roberts Creek, British Columbia, Canada.
- *Beeson, Floyd D., NAS, Navy # 520, Box 35, FPO, San Francisco. (Wentletraps, Cowries, Cones.)
- Beetle, Mrs. Dorothy, Charlotte Children's Nature Museum, 1658 Sterling Rd., Charlotte, N. C. 28209. (Land and freshwater world shells.)
- *Behrens, Grace, Apt. 22, 360 Chevy Chase Drive, Glendale, Calif. 91204. (Abalone and starfish.)
- Bell, Jas. H., 5227 Ridgedale Ave., Dallas, Texas 75206.
- *Bequaert, Dr. Joseph C., Dept. of Entomology, Univ. of Ariz., Tucson, Ariz. 85717.
- Berg, Mrs. Frederick C., Georgetown, Md. 21930. (Shells of the Florida Keys.)
- Bergeron, Eugene, P.O. Box 1236, Balboa, Canal Zone. (Biological survey of Panamic range fauna Mollusca.)
- Berry, Dr. and Mrs. Elmer G., 1336 Bird Rd., Ann Arbor, Mich. 48103.
- Berry, Mrs. Ruth M., 709 Parker St., Durham, N. C. 27701.
- *Berry, Dr. S. Stillman, 1145 W. Highland Ave., Redlands, Calif. 92373.
- Bickel, David, Dept. Biology, Univ. of Louisville, Louisville, Ky. 40208. (Systematics and ecology of fw. mollusks, esp. pleurocerid snails.)
- Bijur, Jerome M., 215 S. Fairfield Rd., Devon, Penn. 19333. (Florida marine shells; buy, exch.)
- Bippus, Alvin C., 2743 Sagamore Rd., Toledo, Ohio 43606. (Marine gastropods.)
- Bixby, Mrs. H. M., Look See, Captiva, Fla. 33924. Summer: Bolton Landing, N. Y. 12814.
- Blaine, Mr. and Mrs. Alger P., 74 Palmer Ave., Springfield, Mass. 01108. Winter: 237 19th Ave., S. St. Petersburg, Fla. 33705.
- Blanchard, Adrian G., 802 E. Main St., P.O. Box 713, New Port Richey, Fla. 33552. (All shells, Recent and fossil.)
- *Blankley, Wm. F., Scripps Institution of Oceanography, La Jolla, Calif. 92038. (Cephalopoda; synoptic collection of mollusks.)
- Blinn, Dr. Walter C., Dept. Nat. Sci., Michigan State Univ., E. Lansing, Mich. 48823. (Ecology, behavior of land snails.)
- *Boneff, Mr. and Mrs. R. J., 2217 S. E. Madison, Portland, Ore. 97214. (Indo-Pacific specimen shells.)
- Boss, Dr. Kenneth, Ichthyological Lab., U. S. Nat. Museum, Washington, D. C. 20240.
- Boston Malacological Club, Mollusk Dept., Museum Comparative Zoology, Cambridge, Mass. 02138.
- *Boyle, Mrs. R. T. and Tim, 946 E. Granada Rd., Phoenix, Ariz. 85006. (Shell collecting; oceanography; marine biology.)
- Bradfield, Mrs. Jesse, 339 Mt. Alto, Rome, Ga. 30163. (General interest.)
- Bradley, J. Chester, 604 Highland Rd., Ithaca, N.Y. 14850.
- Bradley, John C., 469 Farmington Ave., Waterbury, Conn. 06710. (Travel and collect.)
- *Bratcher, Twila L., 8121 Mulholland Terr., Hollywood, Calif. 90046.
- Brazoria County Shell Club, c/o Mrs. R. C. Rost, Jr., Box 563, Brazoria, Texas 77422.

- Brooks, Mr. and Mrs. John C., 3217 Wickersham Court, Orlando, Fla. 32806. (Fla. marine mollusks.)
- Broward Shell Club, c/o Mrs. Jean Redding, 517 S. W. 9th St., Ft. Lauderdale, Fla. 33315.
- *Brown, Dorothy, 2535 Loring St., Pacific Beach, San Diego, Calif. 92109. (Pectens.)
- Brown, Dr. and Mrs. Harvey E., 9455 S. W. 81st Ave., Miami, Fla. 33156.
- Brown, Mrs. Ward, 1420 N. Lakeside Dr., Lake Worth, Fla. 33460.
- Broyles, Mr. and Mrs. Ralph E., 5701 Fairfield Dr., Ft. Wayne, Ind. 46807.
- *Brugman, Chas., Box 468, Lahaina, Hawaii 96761. (Shells and black coral of Hawaii.)
- *Bryan, Edwin H., Jr., Bishop Museum, Honolulu, Hawaii 96819. (Pacific biogeography and bibliography.)
- Buck, Mrs. John H., 499 Bair Rd., Berwyn, Penn. 19312. (Conidae.)
- Bullis, Harvey R., Jr., 101 Hague St., Pascagoula, Miss. 39567. (Western Atlantic, Caribbean, and Gulf of Mexico gastropods.)
- Burch, Dr. John B., Museum of Zool., Univ. of Mich., Ann Arbor, Mich. 48104. (Land and freshwater mollusks.)
- **Burch, Mr. and Mrs. John Q., 4206 Halldale Ave., Los Angeles, Calif. 90062.
- **Burch, Dr. and Mrs. Thos., 914 W. Palm Lane, Phoenix, Ariz. 85007. (Dredging.)
- Burgers, Dr. and Mrs. J. M., 4622 Knox Rd., Apt. 7, College Park, Md. 20740.
- Burke, Alice A. and Thos. D., Jr., 1820 S. Austin Blvd., Cicero, Ill. 60650. (Marine mollusks of eastern U. S. A.)
- *Campbell, Dr. Bruce, 11221 Elm St., Lynwood, Calif. 90263.
- *Campbell, R. W., 5536 Hardwick St., Burnaby 2, British Columbia, Canada. (Pacific Coast marine and terrestrial gastropods; exch.)
- Cardeza, Carlos M., 2309 Sunset Blvd., Houston, Texas 77005. (Amateur.)
- Carley, T. S., 407 Kingston, Deerfield, Ill. 60015.
- *Carney, W. Patrick, Dept. of Zool., Univ. of Montana, Missoula, Mont. 59801.
- Carriker, Dr. M. R., Marine Biological Lab., Woods Hole, Mass. 02543. (Shell demineralization; boring mechanisms of mollusks; marine ecology.)
- Cartwright, Mr. and Mrs. Jas. B., 4533 Park Ave., Memphis, Tenn. 38117. (Atlantic and Gulf Coast shells.)
- Casa Ybel Hotel and Beach Club, Sanibel Is., Fla. 33957.
- **Cate, Mr. and Mrs. Crawford N., 12719 San Vicente Blvd., Los Angeles, Calif. 90049. (*Mitra*, *Cypraea*; no exchanges.)
- *Chace, Mr. and Mrs. Emery P., 3446 Van Dyke Ave., San Diego, Calif. 92105.
- Chandler, Carl and Doris, P.O. Box 621, Rt. 28, Chatham, Mass. 02633. (*Conus*, *Cypraea*.)
- Chatham Marine Shell Museum, Carl and Doris Chandler, Directors, P.O. Box 621, Rt. 28, Chatham, Mass. 02633.
- Chicago Shell Club, Chicago Natural History Museum, Chicago, Ill. 60605.
- Clark, Mrs. Dorla, Sun Circle Resort, Orange Beach, Ala. 36561.
- Clark, Wm. F., Mark D. and Robt. G., 504 Valley Rd., Terre Haute, Ind. 47803. (World shells.)
- Clarke, Dr. Arthur H., Jr., Dept. of Mollusks, Natl. Museum of Canada, Ottawa, Ontario, Canada.
- Clarke, Dr. Rosemary, 2049 University Ave., Dubuque, Iowa 52002.
- Clench, Dr. Wm. J., Museum of Comp. Zool., Cambridge, Mass. 02138.
- Cleveland Museum of Nat. Hist., 10600 E. Blvd., Cleveland, Ohio 44106.

- Cloidt, Chas. J., 74 Manhattan Ave., Avenel, N. J. 07001. (Shells of New Guinea and the Philippines.)
- *Coan, Eugene, 891 San Jude Ave., Palo Alto, Calif. 94306.
- Coastal Bend Shell Club, c/o Corpus Christi Museum, 1202 N. Water St., Corpus Christi, Texas 78401.
- *Coats, Miss Ruth E., 3846 Skyline Dr., Carlsbad, Calif. 92008.
- Cole, Wm. H., 119 Livingston Ave., New Brunswick, N. J. 08902 Winter: 248 Third Ave., So., Naples, Fla. 33904. (Fla. west coast shells.)
- Coley, Mrs. Gene, 2221 Bayview Rd., Punta Gorda, Fla. 33950.
- Compitello, Mrs. Juliette, 399 St. John's Place, Brooklyn, N. Y. 11238.
- *Conchological Club of Southern Calif., Los Angeles County Museum, 900 Exposition Blvd., Los Angeles, Calif. 90007.
- Conch. Section, Buffalo Society Nat. Sci., c/o Mrs. A. L. Potter, 6350 Main St., Williamsville, N. Y. 14221.
- Connecticut Shell Club, Peabody Museum, New Haven, Conn. 06501.
- Connecticut Valley Shell Club, Springfield Museum of Nat. Hist., 236 State St., Springfield, Mass. 01103.
- Conrath, Jas. P., 127 Indiana St., Rapid City, S. D. 57705. (Shell photography.)
- Cooper, Robt. W. and Marjorie, 5012 Pfeiffer Rd., Peoria, Ill. 61607. (Florida marine shells; world *Murex*, *Pecten*, *Spondylus*.)
- Corbett, Wm. Phelps, 2939 Nelson St., Ft. Myers, Fla. 33901. (Exch. rare *Cypraea*, *Olivia*, *Murex*.)
- Corgan, Jas. X., Box 7190, Tulsa, Okla. 74101. (Microscopic gastropods.)
- Cornell University Library, Research Dept., Ithaca, N. Y. 14850.
- Cowles, Edw. F., Jr., 12 Hillcrest Ave., New Rochelle, N. Y. 10801. (Photography; tropical marine shells.)
- *Cox, Keith W., 309 Hillside Dr., Woodside, Calif. 94061.
- Craig, Mrs. G. E. G., Apdo. Postal 448, Guaymas, Sonora, Mexico.
- Craine, Ruth A., 63 West Main St., Norwich, N. Y. 13815.
- *Cramer, Frances L., 967½ W. 30th St., Los Angeles, Calif. 90007.
- Crocker, Mr. and Mrs. Arthur M., Laurel Hollow, Syosset, N. Y. 11791.
- Crum, Mrs. Dan, 930 N. E. 23rd St., Crest Haven, Pompano Beach, Fla. 33064. (*Conus*, *Voluta*.)
- Cull, Mrs. R. R., 7927 Chippewa Rd., Brecksville, Ohio 44141.
- Cummings, Raymond W., 121 Rugby Rd., Syracuse, N. Y. 13206. (Shells of West Indies, esp. Windward and Grenadine Is.)
- Cutler, Henry H., 105 Abbott Rd., Wellesley Hills, Mass. 01570.
- Cvancara, Alan Milton, Dept. Geology, Univ. of N. Dak., Grand Forks, N. D. 58202. (Recent fw. mussels and Early Tertiary mollusks.)
- Daigle, Mr. and Mrs. A. J., 219 Lana Dr., Lafayette, La. (*Murex*.)
- D'Amico, Jos. S., 119 Persimmon Lane, Lake Jackson, Texas 77566.
- D'Attilio, Mr. and Mrs. Anthony, 455 Beach 139th St., Rockaway Beach, N. Y. 11694.
- Danforth, Miss Louise L., Box 415, Vineyard Haven, Mass. 02568.
- Darwin, Mrs. Chas., 1531 Barnes St., Cookeville, Tenn. 38501. (Marine shells; general interest.)
- *Davis, Dr. Geo., Dept. Med. Zool., 406 Med. Lab., U.S. Army Med. Command, Japan, APO San Francisco 96343.

- Dawley, Dr. Charlotte, The Woman's College, Univ. of N. C., Greensboro, N. C. 27412.
- Deatrick, Paul A., 33 N. W. 33rd Ave., Miami, Fla. 33101. (*Strombus, Busycon*.)
- DeLuca, Miss Gladys and Mrs. John A., 16 Oakland Ave., Wollaston, Mass. 02170.
- Desmond, Hon. Thos., 94 Broadway, Newburgh, N. Y. 12553.
- Dexter, Dr. Ralph W., Dept. Biol., Box 507, Kent State Univ., Kent, Ohio 44240.
- Dickenson, Jas. R., M.D., 250 E. State St., Westport, Conn. 06880. (General interest.)
- Dietrich, Mr. and Mrs. Louis E., 310 Veri Ave., Pittsburgh, Penn. 15220.
- Dixon, Mrs. Ruth S., 711 Parker St., Durham, N. C. 27701. (Marine mollusks.)
- Doane, Bonnie L., 8018 Lawrence Ave., Chicago, Ill. 60640. (Marine shells.)
- Dodd, Wm. E., M.D. Ocean St. and Bay Ave., Beach Haven, N. J. 08008.
- Dodge, Henry, 443 Park Ave. S., New York, N. Y. 10016.
- *Donohue, Prof. Jerry, 7337 W. 88th Pl., Los Angeles, Calif. 90045. (Gastropoda.)
- Donovan, Jas. W., 3718 Calvin Ave., West Palm Beach, Fla. 33407.
- Drey (Walter) Associates, 257 Fourth Ave., New York, N. Y. 10010.
- Duarte, Eliseo, Casilla Correro 1401, Central, Montevideo, Uruguay. (Exch. shells and information.)
- Dunbar, Edwin C., Zool. Dept., Univ. of S. Dak., Vermillion, S. D. 57069. (*Goniobasis* sp.)
- Dundee, Dr. Dolores S., Dept. Biol., La. State Univ. in New Orleans, New Orleans, La. 70150. (Land mollusks; freshwater mussels.)
- Dunn, V. Roger, 5021 18th Ave., S., Gulfport, Fla. 33707. (*Conus*.)
- *DuShane, Mrs. Jos., 15012 El Soneto Dr., Whittier, Calif. 90603.
- Dvorak, Stanley J., 3856 W. 26th St., Chicago, Ill. 60623. (Muricidae.)
- Eckhardt, Mary Jean, 35 Prospect Park W., Brooklyn, N. Y. 11215.
- Eddison, Grace G., M.D., 4740 Iselin Ave., Riverdale, N. Y. 10471. (World marine shells.)
- Edmiston, Mrs. J. R., 221 N. La Salle St., Suite 963, Chicago, Ill. 60601.
- Eken, Elizabeth B., M.D., 83 Maple Ave., Morristown, N. J. 07960. (Cones.)
- Ellis, Dr. Derek V., Dept. Biol., Victoria Univ., Victoria, B. C., Canada.
- Emerson, David N., Dept. Zool., Univ. of S. Dak., Vermillion, S. D. 57069. (Snail physiology.)
- Emerson, Dr. William K., Museum of Nat. Hist., Central Park W. at 79th St., New York, N. Y. 10024.
- Emery, Adele K., Box 1265, South Miami, Fla. 33143. (Florida east coast shells.)
- Enders, Mr. and Mrs. Ernest M., 3 Ellen Dr., Farmington, Conn. 06032. (Specimen world shells.)
- Endres, Theo. F., 663 Pleasant St., Algonac, Mich. 48001. (Amateur.)
- Erickson, Carl W., 4 Windsor Ave., Auburn, Mass. 01501.
- Espinosa, Tania, 6555 Broadway, New York, N. Y. 10071.
- Eubanks, Mrs. Edwin W., 3524 Tanglebriar Dr., Pasadena, Texas 77503. (Florida marine shells.)
- *Eyerdam, Walter J., 7531 19th Ave., N. E., Seattle, Wash. 98115.
- *Fancher, Madeline J., Box 144, Bridge Rt., Myrtle Point, Ore. 97458. (Amateur.)
- Farrell, Lyle H., Proctor Academy, Andover, N. H. 03216.
- Faulkinbury, R. P., 106 Pensacola Ave., Fairhope, Ala. 36532. (Small shells of north-west Florida and Alabama.)
- Feinberg, Harold, 2334 Tietbout Ave., Bronx, N. Y. 10458. (Land and freshwater shells.)

- Ferguson, Dr. and Mrs. John H., School of Med., Univ. of N. Car., Chapel Hill, N. Car. 27515.
- Ferguson, Robt. A. and Etta G., 125 Vigilante St., K. I. Sawyer AFB, Mich. 49843.
- Fetherston, Mr. and Mrs. Thos. C., Mill Point Farm, Rt. 3, Cambridge, Md. 21613. (Self-collected Am. marine shells.)
- *Field, Clyde L., 2534 'K' Ave., National City, Calif. 92050.
- Finlay, C. John, 16 N. Woodward Ave., Roselle, Wilmington, Del. 19805. (West Indian marine shells.)
- *Fitch, John E., State Fisheries Lab., Terminal Is., San Pedro, Calif. 90731.
- *Fletcher, Howard L., 1008 La Hermosa Dr., Redlands, Calif. 92373.
- Flipse, Robt. C., M.D., and Mrs. Flipse, 1091 N. E. 88th St., Miami, Fla. 33138.
- Foehrenbach, Jack, 91 Elm St., Islip, L. I., N. Y. 11751. (Ecology of marine mollusks.)
- Ford, Mr. and Mrs. Flynn, 7 Glenn Creek Lane., St. Louis, Mo. 63124.
- *Forthun, Miss Effie, 507 Harvard E., Apt. 203, Seattle, Wash. 98102.
- Foster, Mrs. Fred H., P.O. Box 213, Oxford, Ind. 47971. (Shells in general.)
- Frampton, Mr. and Mrs. Henry G., Box 1052, Miami, Fla. 33106.
- *Franchini, Irene, P.O. Box 41, Tranquillity, Calif. 93668.
- Franks, Donald E., 279 Corydon Dr., Miami Springs, Fla. 33166. (World shells; coll. and exch.)
- Franzen, Dr. Dorothea, Ill. Wesleyan Univ., Bloomington, Ill. 61702.
- Freeman, Mr. and Mrs. Harley L., 353 S. Atlantic Ave., Ormond Beach, Fla. 32074. (West Atlantic shells.)
- **French, Mr. and Mrs. Mead, P.O. Box 1148, San Pedro, Calif. 90733.
- Fusto, Thos. R., 775 Roosevelt St., Franklin Sq., N. Y. 11010.
- Garden State Shell Club, c/o Jane Zager, 326 Union Ave., Irvington, N. J. 07111.
- Garoian, Dr. Geo., Dept. Zool., So. Ill. Univ., Carbondale, Ill. 62901.
- Gause, Wanda Van Brunt, 3801 Alhambra Circle, Coral Gables, Fla. 33134. (Florida shells.)
- Geological Survey of Canada Library, Room 350, 601 Booth St., Ottawa, Ontario, Canada.
- Ghiselin, Dr. Michael T., Systematics-Ecology Program, Marine Biol. Lab., Woods Hole, Mass. 02543.
- *Giger, Ray, Giger's Souvenirs of the sea, 1644 Monterey Blvd., Hermosa Beach, Calif. 90254. (*Abalone*, snails, Recent and fossil shark teeth.)
- Gilbert, Mrs. Laura, 451 Hammond Ave., San Antonio, Texas 78210. (All shells.)
- Gillam, Elizabeth H., 7 Clifton Ave., Merchantville, N. J. 08109. (Amateur.)
- Gilmour, Thos. H. J., Dept. Biology, Univ. of Saskatchewan, Saskatoon, Saskatchewan, Canada. (Anisomyarian bivalves.)
- Goldschmidt, Faith K., 302 S. 11th Ave., Highland Park, N. J. 08904. (World shells; exch.)
- Good, Mrs. Barbara J., 3142 Larga Court, San Diego, Calif. 92110.
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- Gordon, Mackenzie, Jr., c/o American Consulate PA, APO 676, New York, N. Y. 09676. (West American Mollusca.)
- Goss, Richard, 5 Chamberlin Drive, Marathon, Fla.
- Graaf, Gerrit de, 10915 S. W. 55th St., Miami, Fla. 33165.
- Grabie, Mrs. A. J., 286 Grand Central Ave., Amityville, L. I., N. Y. 11701.
- Graf, Jas. R., 3117 Grindon Ave., Baltimore, Md. 21214. (World shells.)

- Grantier, Mrs. Bruce, 20 Hobart Dr., Willowdale, Ontario, Canada. (Persian Gulf shells.)
- Graves, Howard B., Jr., 826 S. Ingraham, Lakeland, Fla. 33801. (*Conus*.)
- Greater St. Louis Shell Club, c/o Mrs. Chas. Novak, 3456 Keokuk St., St. Louis, Mo. 63118.
- Greathouse, Mrs. W. J., 300 Vaden Rd., Poplar Bluff, Mo. 63901. (Panama shells.)
- Greenberg, Isidore, 1245 Eastern Pkwy., Brooklyn, N. Y. 11213. (Photograph and collect shells.)
- *Gregg, Wendell O., M.D., 2220 S. Harvard Blvd., Los Angeles, Calif. 90018.
- Griffith, Mrs. Lela M., Egmont, British Columbia, Canada. (British Columbia marine shells, also *Conus* and *Cypraea*.)
- Gruetzmacher, Inez, 534 1st St., Menominee, Mich. 49858.
- *Gudnason, Mrs. Harold, 1959 Wrenn St., Oakland, Calif. 94602.
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- Gulf Coast Shell Club, c/o Mrs. J. B. Bishop, P.O. Box 511, Vidor, Texas 77662.
- Gunter, Gordon, Gulf Coast Research Lab., Ocean Springs, Miss. 39564. (Ostreidae.)
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- Hall, Mrs. Warner L., 727 Queen's Rd., Charlotte, N. C. 28207.
- *Hamaker, Frances H., 2519 Niagara Way, Los Angeles, Calif. 90041. (Collect and exch.)
- Hamilton, Mrs. Wm. J., 615 Highland Rd., Ithaca, N. Y. 14851.
- *Hancock Library of Biology and Oceanography, Univ. of Southern Calif., Los Angeles, Calif. 90007.
- *Hand, Dr. Cadet H., Dept. Zool., Univ. of Calif., Berkeley, Calif. 94720.
- Hano, Philip L., 515 E. 89th St., New York, N. Y. 10028. (Rare shells.)
- **Hanselman, Lt. Col. and Mrs. G. A., 5818 Tulane St., San Diego, Calif. 92122.
- Hanssler, Dorothy E., 64-31 17 Pl., N., St. Petersburg, Fla. 33710.
- Harman, Willard N., 149 Stadium Pl., Syracuse, N. Y. 13200. (Fw. mollusca.)
- Harris, Maj. and Mrs. Marion J., Rt. 4, Box 1436, Brooksville, Fla. 33512.
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- *Hawaiian Malacological Society, c/o Aquarium, 2777 Kalakaua Ave., Honolulu, Hawaii 96815.
- Hayes, Alfred B., Box 4704, Christiansted, St. Croix, Virgin Islands 00821.
- Heard, Dr. Wm., Dept. Biol. Sci., Fla. State Univ., Tallahassee, Fla. 32301. (Land and freshwater mollusks—ecology, etc.)
- Heck, Maj. Ralph L., P.O. Box 8426, Shreveport, La. 71108. (World gastropods, esp. *Conus*, *Cypraea*.)
- Hermann, Mrs. Pat, 3015 Highland Rd., Apt. 2, Baton Rouge, La. 70802. (Land snails.)
- Herrington, Rev. H. B., Westbrook Heights, Westbrook, Ontario, Canada. (Sphaeriidae.)
- *Hertlein, Dr. Leo G., Calif. Academy of Sci., San Francisco, Calif. 94118.

- Hesse, Stanley H., 2245 Edgewood Ave., Bethlehem, Penn. 18017. (Shells of Cape Hatteras, N. C.)
- Hettick, Mrs. G. Riley, 933 Lynwood Dr., Bartlesville, Okla. 74003.
- Higbee, Mrs. Florence and Joan, 13 N. Bedford St., Arlington, Va. 22201.
- *Hinshaw, Merton E., Bower Memorial Museum, 2000 N. Main St., Santa Ana, Calif. 92707.
- Hirsch, Albert W. H., Sr., 3703 San Juan St., Tampa, Fla. 33609. (Cones, cowries, auger shells.)
- *Hitt, Richard E., 1210 W. Highland, Santa Ana, Calif. 92703. (Calif. and Mexican shells.)
- *Hoffman, Al, 1010 Garden St., Santa Barbara, Calif. 93101.
- Holeman, John, 314 Terrace Rd., Schenectady, N. Y. 12306.
- Holle, Dr. Paul A., 7 Mars Dr., Shrewsbury, Mass. 01545. (Salt marsh snails.)
- Hollister, Dean S. C., 201 Hollister Hall, Cornell Univ., Ithaca, N. Y. 14850.
- Homer, Sylvia, 1723 E. Second St., Brooklyn, N. Y. 11223.
- Hood, Elizabeth, 1742 Meredith Lane, Clearwater, Fla. 33516. (Mollusks and starfishes.)
- Hornstein, Leon, 2211 Arden Rd., Baltimore, Md. 21209. (Amateur.)
- *Howard, Mrs. Faye B., 4167 Creciente Dr., Santa Barbara, Calif. 93105. (Gulf of California shells.)
- Hubbard, Mrs. Stanley A., 409 McPherson St., Bremen, Ga. 30110.
- Huber, Julia M., Museum of Zool., U. of Mich., Ann Arbor, Mich. 48104.
- Hubricht, Leslie, 3235 23rd Ave., Meridian, Miss. 39303. (U. S. land and freshwater shells.)
- Hughes, Leonard, 114 E. Lockwood, Webster Groves, Mo. 63119. (S. Fla. Gulf collecting.)
- Hughes, Dr. and Mrs. W. Gordon, 189 Elm St., South Dartmouth, Mass. 02748.
- *Humme, Mrs. June H., Box 56, Waipahu, Hawaii 96797. (Bivalves, also self-collected shells.)
- *Hunt, Helen B., 1165 Arch, Berkeley, Calif. 94708.
- Hunter, Mrs. Anne, 126 Cedar Ave., Hackensack, N. J. 07601.
- Hunter, Dr. W. D. Russell, Dept. of Zool., Syracuse Univ., Syracuse, N. Y. 13210.
- Hutchison, Richard D., 1116 Aldoro Dr., Waukesha, Wisc. 53186. (Ecology and paleoecology.)
- Isom, Billy G., TVA, Fish and Wildlife Br., A24, Administration Bldg., Wilson Dam, Ala. 35661. (Freshwater mollusks.)
- Ives, Harlem B., 8401 W. Chicago Ave., Detroit, Mich. 48204.
- Jackson, Ralph W., Rt. 3, Cambridge, Md. 21613. (Land shells; exch.)
- Jacksonville Shell Club, c/o Robt. A. Melton, 2224 Newbery Rd., Jacksonville, Fla. 32218.
- Jacobs, George, 853 Riverside Dr., New York, N. Y. 10032. (Buy and exch. foreign land and marine shells.)
- Jacobson, Morris Karl, 455 Beach 139th St., Rockaway Beach, N. Y. 11694.
- James, Mrs. Frederic, 644 Westover Rd., Kansas City, Mo. 64113.
- Jensen, Mr. and Mrs. Norman, 30-83 Crescent St., Apt. B3, Astoria, N. Y. 11102
- *Johnson, Col. Harvey A., 3915 S. W. 109th St., Seattle, Wash. 98146.
- Johnson, Mrs. Kenneth L., 3206 Sussex Rd., Raleigh, N. C. 27607. (Amateur.)

- Johnson, Reynold and Ronald, 147 Walrath Rd., Syracuse, N. Y. 13205. (Coll. and exch. world shells.)
- Johnson, Richard I., 124 Chestnut Hill Rd., Chestnut Hill, Mass. 02167. (Unionidae and books.)
- Johnstone, Mr. and Mrs. Harry I., 'Palmetto,' 2209 River Forest Dr., Mobile, Ala. 36605.
- Jones, Dr. David T., P.O. Box 1, Bourbonnais, Ill. 60914.
- *Jones, Ralph H., 6800 50th, N. E., Seattle, Wash. 98115. (South Pacific shells.)
- Joy, Mr. and Mrs. Frederick van B., Van Beuren Rd., Morristown, N. J. 07960.
- *Kanakoff, Geo. P., 1019 S. Longwood Ave., Los Angeles, Calif. 90019.
- Katsaras, Nick, 479 B S. Washington Ave., Bergenfield, N. J. 07621.
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- *Keen, Dr. A. Myra, Dept. Geol., Stanford Univ., Stanford, Calif. 94305.
- Keferl, Eugene P., 1084 Sells Ave., West, Apt. D., Columbus, Ohio 43212. (Terrestrial gastropods.)
- Kendall, Mrs. Henry P., Moose Hill Farm, Sharon, Mass. 02067.
- Kennedy, Mr. and Mrs. Douglas and Miss Caroline, 1071 Northampton St., Holyoke, Mass. 10141.
- Kettell, Rev. and Mrs. A. B., RFD 1, Unionville, Conn. 06085. (Private collection.)
- *Kile, Chas. O., Box 2046, Agana, Guam 96910. (All shells.)
- *King, David Shaw, 200 Golden Gate Ave., Belvedere, Calif. 94920. (Caribbean gastropods.)
- Kingston, Harry L. and Mrs. Harry, 1670 Fairway Dr., Beaumont, Texas 77703. (Exch. and buy world shells.)
- Kline, Mr. and Mrs. Geo. F., 353 Shunpike Rd., Madison, N. J. 07940.
- *Kohn, Dr. Alan J., Dept. Zool., Univ. of Washington, Seattle, Wash. 98105.
- *Kondo, Dr. Yoshio, Bernice Bishop Museum, Honolulu, Hawaii 96819.
- Kraemer, Mrs. Louise R., Dept. Zool., Univ. of Ark., Fayetteville, Ark. 72702. (Fresh-water lamellibranchs.)
- Krause, John A., 44 Ridge St., Manchester, Conn. 06044. (Scaphopods.)
- *Krauss, N. L. H., 2437 Parker Place, Honolulu, Hawaii 96814. (Carnivorous land snails and biology.)
- Kuchar, Mr. and Mrs. Jos. J., 11 Franklin Ave., Montvale, N. J. 07645.
- Kuczynski, Florence, 7400 46th Ave., N., Lot 406, St. Petersburg, Fla. 33709. (All shells; collect, exch., photograph.)
- Kurz, Richard M., 1575 N. 118 St., Wauwatosa, Wisc. 53226. (Large specimen shells.)
- Kwajalein Malacological Society, Box 1388, APO, San Francisco 96555.
- Lamberts, Dr. Austin and Evangeline, 1520 Leffingwell, N. E., Grand Rapids, Mich. 49505.
- Landsee, Mrs. C. G., 963 Fair Meadow Rd., Memphis, Tenn. 38117. (All shells, esp. *Murex*, *Conus*, *Voluta*.)
- *Lange, Dr. W. Harry, Div. of Entomology, U. of Cal., Davis, Calif. 95616.
- *La Rivers, Dr. Ira, Biol. Society of Nevada, P.O. Box 8096 Univ. Sta., Reno, Nev. 89507.
- LaRocque, Dr. Aurele, Dept. Geol., Ohio State Univ., 125 S. Oval Dr., Columbus, Ohio 43210.
- **Larson, Mr. and Mrs. Douglas, Gen. Del., Cambria, Calif. 93428.

- Lawler, David, 680 Queen St., Bridgeport, Conn. 06606. (*Cypraea*.)
- Lawrence, Mrs. Kay, 88 Siders Pond Rd., Falmouth, Mass. 02540. (Pectinidae.)
- Lawson, Arthur and Selma, 2600 Pass-a-Grille Way, Box 6882, Pass-a-Grille, Fla. 33741. (Specimen shells.)
- Leslie, Theodore, 883 Craig St., Belize, British Honduras.
- Lewis, Dr. and Mrs. John R., 4915 Northcott Ave., Downers Grove, Ill. 60515. (*Murex*.)
- Lewis, Mrs. J. Kenneth, 9207 48th Ave., College Park, Md. 20741.
- Lewis, Mr. and Mrs. Kenneth R., 1705 Pelican Dr., Merritt Is., Fla. 32952.
- Light, Frank B., Jr., Wyoming Seminary, Kingston, Penn. 18704. (Collector.)
- Lindsay, Dan, P.O. Box 67, Blue Springs, Mo. 64015. (General interest.)
- Lineaweaver, Mrs. Chas. B., 720 Park Ave., New York, N. Y. 10021.
- *Long Beach Shell Club, c/o Mrs. Ralph Hall, 5246 E. Florence Ave., # 95, Bell, Calif. 90203.
- *Long, Mary E., 36 W. Lytton St., Sonora, Calif. 95370. (Marine shells.)
- **Loosanoff, Dr. and Mrs. Victor, 17 Los Cerros Dr., Greenbrae, Calif. 94904.
- Lotz, Mr. and Mrs. Frank B., 5611 Groveton, Houston, Texas 77033.
- Lowry, Walter G., Jr., 5404 Overlook Dr., Rt. 1, Raleigh, N. C. 27602.
- Luttrell, Mr. and Mrs. A. L., Wall Lane and Old Georgetown Rd., Rockville, Md. 20852. (Marines and fossils.)
- MacBride, Grace, R.D. 1, Hartman Rd., North Wales, Penn. 19454.
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- MacMillan, Gordon K., 169 Glenfield Dr., Pittsburgh, Penn. 15235.
- Maes, Virginia Orr, Dept. Mollusks, Academy Nat. Sci., Philadelphia 19103.
- Malek, Dr. Emile A., Tulane Univ. School of Med., Dept. Tropical Med., New Orleans, La. 70112. (Medical malacology.)
- Malick, Donald, 5514 Plymouth Rd., Baltimore, Md. 21214. (Fossils—buy, sell, exch.)
- Malone, Elsie, Sanibel Island, Fla. 33957. (Buy, sell, exch. world shells.)
- Mancebo, Servio Tulio, Intendente General, Universidad Autonoma de Santo Domingo, Republica Dominicana.
- Manes, Mrs. Sidney, Knollwood Rd., Fayetteville, N. Y. 13006.
- Marcott, Mrs. Edna, 4545 77th Way, N., St. Petersburg, Fla. 33709. (Fla. west coast shells; Pliocene fossils.)
- Marsh, Mrs. Theresa C., 1140 N. E. 24th Ave., Apt. C, Pompano Beach, Fla. 33062. (Southeastern Florida marines; worldwide colorful bivalves.)
- *Marshall, Mrs. Thos. H., 2237 N. E. 175th St., Seattle, Wash. 98155. (World shells; exch.)
- Mattera, Albert and Mrs. Emily, 301 Dearborn Ave., Silver Spring, Md. 20901. (Pacific marine shells.)
- Matteson, Dr. Max R., Dept. Zool., Univ. of Ill., Urbana, Ill. 61803.
- Mauseth, E. L., Alden, Minn. 56009. (All shells.)
- McCallum, Gladys, Meadowvue Dr., Rt. 2, Wexford, Penn. 15090.
- *McCammon, Mrs. Leonard J., 16570 Garden Lane, Los Gatos, Calif. 95030. (Gastropods of the California coast; ecology.)
- McCarty, Col. Wm. A., 12447 32nd St., Omaha, Neb. 68123.
- McClary, Andrew, Dept. of Nat. Sci., Mich. State Univ., East Lansing, Mich. 48823. (Behavior of gastropods.)
- *McClure, Mrs. Virginia H., 317 S. Wetherly Dr., Beverly Hills, Calif. 90211.

- McCraw, Dr. Bruce M., Ontario Veterinary College, Guelph, Ontario, Canada.
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- Mead, Dr. Albert R., Dept. Zool., Univ. of Arizona, Tucson, Ariz. 85702. (Terrestrial snails and slugs; Giant African Snail.)
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- Merrill, Dr. Arthur S., Bureau Comm. Fisheries, Biol. Lab., Oxford, Md. 21654.
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- Mohorter, Willard, Standard Publishing Co., Cincinnati, Ohio 45231. (Field collecting *Cypraea*, *Murex*, *Pecten*, *Voluta*.)
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- Muirhead, Miss Mary Agnes, 27 S. Monterey Dr., Hope Pastures, Kingston, Jamaica, B. W. I. (Marine mollusks.)
- Murphy, Mrs. Priscilla, Sanibel Island, Fla. 33957. (World shells.)
- Murray, Mrs. Francis A., 11 Old Orchard Rd., New Rochelle, N. Y. 10804.
- Murray, Dr. Harold D., Biol. Dept., Trinity Univ., San Antonio, Texas 78212. (Unionidae, distribution and parasites.)
- Musial, Mr. and Mrs. Eugene, 53 Idlewood Dr., Tonawanda, N. Y. 14151.
- Myer, Dr. Donal G., Southern Ill. Univ., Alton, Ill. 62004. (Land snails.)
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- N. Carolina Shell Club, c/o Hugh Porter, Fisheries Res. Inst., Morehead City, N. C. 28557.
- Norton, Mr. and Mrs. LeRoy, Presque Isle, Maine 04769. (Freshwater mollusks.)
- Notter, Miss Helen, 2529 Gilmore St., Jacksonville, Fla. 32204.
- Novak, Mildred M., 3456 A Keokuk St., St. Louis, Mo. 63118. (*Murex*, *Voluta*, corals.)
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- Ostheimer, Ruth E. M., 146 S. Whitford Rd., Whitford (Exton P.O.), Penn. 19341.
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- *Pacific Shell Club, Los Angeles County Museum, Los Angeles, Calif. 90007.
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- Palmer, Dr. Katherine V. W., Paleontological Research Inst., 109 Dearborn Pl., Ithaca, N. Y. 14850.
- Parodiz, Dr. and Mrs. Juan J., Sect. of Invertebrates, Carnegie Museum, Pittsburgh, Penn. 15213. (Neotropical mollusks and freshwater gastropoda of U.S.A.)
- Parsons, Dr. and Mrs. John W., 324 Taplow Rd., Baltimore, Md. 21212. (Western Atlantic sp.)
- Pasternack, Dr. and Mrs. Richard, 1224 Seminole Dr., Ft. Lauderdale, Fla. 33304.
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- Peterson, Mrs. Ethel, 810 N. "D" St., Indianola, Iowa 50125. (Collect and classify shells.)
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- Petit, Mr. and Mrs. Richard, Box 133, Ocean Drive Beach, S. C. 29582. (World shells.)
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- Phillips, Walter H., St. Thomas Harbour, Water Isle, St. Thomas, Virgin Islands 00801.
- Pinkerton, C. E., USNRTC, Bldg. 84, NAS, Corpus Christi, Texas 78400. (*Conus*, *Murex*, *Voluta*, *Spondylus*.)
- Pittsburgh Shell Club, Sect. of Invertebrates, Carnegie Museum, Pittsburgh, Penn. 15213.
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- Podell, Irving, 210 W. 70th St., New York City 10023. (*Cypraea*.)
- Poling, Jas. W., 400 E. 59th St., New York, N. Y. 10022.
- *Pond, Herbert H., 9299 Duncan, Riverside, Calif. 92503. (Collect and study; *conus*, *cypraea*.)
- Porter, Mr. and Mrs. Dan, Hudson House, Ardsley-on-Hudson, N. Y. 10503.
- Porter, Hugh J., Inst. Fisheries Research, Morehead City, N. C. 28557. (Systematics on the culture of bivalves.)
- Porter, Mrs. Miriam E., 33 Vernon Pl., Melbourne, Fla. 32901.
- Potter, Lawrence, 15 Rogers Ave., Bellport, N. Y. 11713. (Western Atlantic *Conus* and *Voluta*.)
- Potter, Mrs. A. Leslie, 6350 Main St., Williamsville, N. Y. 14221.
- Powell, Mrs. Betty, Betty's Hawaiian Village, Sanibel Island, Fla. 33957.
- Powell, Richmond, The Shell Factory, Box BB, Ft. Myers, Fla. 33902.
- Proetz, John B., Box 334, Boynton Beach, Fla. 33435.
- Ptolemy, Mrs. Wm. R., 220 Sanatorium Rd., Hamilton, Ontario, Canada. (Collect, exch. world shells.)
- Pulley, Thos. E., Museum of Nat. Hist., Houston, Texas 77001.
- *Purdy, Mrs. Ben, 3658 Euclid Ave., San Diego, Calif. 92105. (Gulf of Calif. shells.)
- Raeihle, Mr. and Mrs. Geo., 7924 Ankener Ave., Elmhurst, N. Y. 11373.
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- Rath, Donald and Shirley B., South Side Rd., York, Maine 03909.
- Rathburn, Mr. and Mrs. Harold, 1133 Gulf of Mexico Dr., Sarasota, Fla. 33577. (Fossil marine mollusks.)
- Rawles, Dr. Hugh C., Eastern Ill. Univ., Dept. of Zool., Charleston, Ill. 61920.
- Reader, Mr. and Mrs. Wm. R., 4772 49th Ave., N., St. Petersburg, Fla. 33714. (Live mollusks.)
- Reed, Murry E., 162 19th Ave., N. E., St. Petersburg, Fla. 33704.
- Reid, Mrs. Vinson, Littleton Rd., Westford, Mass. 01886. (Amateur; exch.)
- *Rex, Miss Edith R., 273 Euclid Ave., Long Beach, Calif. 90803.
- Rheder, Dr. Harald A., U. S. Natl. Museum, Washington, D. C. 20560.
- *Rice, Thos. C., Rt. 2, Box 483, Poulsbo, Wash. 98370. (All shells; exch.)
- Richards, Dr. Horace G., Academy of Nat. Sci., Philadelphia, Penn. 19103.
- *Richart, Mae Dean, 15 Moffitt St., San Francisco, Calif. 94131. (West coast shells.)
- *Richmond, Mrs. Ruth, 222½ S. Reeves Dr., Beverly Hills, Calif. 90212. (*Murex*, *Spondylus*.)
- Rickard, Mrs. Grace L., 9316 Harvey Rd., Silver Spring, Md. 20910.
- Ridge, Mrs. W. D., 373 Fortuna Ave., St. Augustine, Fla. 32084.

- Rios, Dr. E. C., Caixa Postal Museu Oceanografico, 379 Praca Tamandare—Rio Gr., Rio Grande do Sul, Brazil. (Marine shells.)
- Risser, Okla. Sci. and Arts Found., Inc., 3000 W. Gen. Pershing Blvd., Fair Park, Oklahoma City, Okla. 73101. (Marine gastropods.)
- Ritchie, Mrs. Rebecca P., Dock Ledge, Marblehead, Mass. 01945. (World marine shells, esp. *Marginella*.)
- *Roberts, Mrs. Ted R., 2839 S. W. Champlain Dr., Portland, Ore. 97201.
- Robertson, Dr. Robert, Dept. of Mollusks, Academy of Nat. Sci., Philadelphia, Penn. 19103.
- Robinson, Geo. D., 5347 Dartmouth Ave., N., St. Petersburg, Fla. 33710. (Collect, buy, sell, exch.)
- Rochester Shell and Shore Club, c/o Marjorie Brenneman, 67 Clearview Dr., Penfield, N. Y. 14526.
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- Rosewater, Dr. Joseph, Div. of Mollusks, U. S. Natl. Museum, Washington, D. C. 20560. (Systematics; freshwater and marine.)
- *Roth, Barry, 544A Union St., Monterey, Calif. (Pacific Coast marine shells.)
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- *Sacramento Valley Conch. Society, c/o Bertha C. Finke, 347 40th St., Sacramento, Calif. 95819.
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- Schroth, Marian M., 9113 84th St., Woodhaven, N. Y. 11421. (Littorinidae, also all juvenile mollusks.)
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- Seipel, Celia M., U. S. Naval Sta., Box 28, New York 09550. (General interest.)
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- Smith, Mrs. Harrison, 1420 Girard Trust Bldg., 1400 Penn Sq., Philadelphia, Penn. 19102.
- Smith, Mr. and Mrs. Harry M., 1410 Wayne St., Sandusky, Ohio 44870. (Local and foreign collecting.)
- Smith, Lee Anderson, Exploration Dept., Geologic Research, Humble Oil Co., Houston, Texas 77001.
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- *Stanford University Libraries, Stanford, Calif. 94301.
 Stansbery, Dr. David H., Nat. Hist. Museum, Columbus, Ohio 43210. (Naiades.)
- *Stasek, Chas. R., Dept. Invertebrate Zool., Calif. Academy of Sci., San Francisco, Calif. 94118. (Growth, form and evolution of bivalve Mollusca.)
- Steger, Mr. and Mrs. Dan, 2711 68th St., Tampa, Fla. 33619. (Marine fauna, Gulf of Mexico.)
- Stein, Carol B., Nat. Hist. Museum, Columbus, Ohio 43210. (Freshwater bivalves.)
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- Stevenson, Robt. E. and Thelma M., Dept. Geol., Univ. S. D., Vermillion, S. D. 57069. (Fossil mollusks and their Recent equivalents.)
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- Taxon, Albert, 25 Knolls Crescent, Bronx, N. Y. 10463. (Marine mollusks.)
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- *Univ. of Ariz. Library, Tucson, Ariz. 85702.
- *Univ. of Calif. at Los Angeles Geology Library, Los Angeles, Calif. 90024.
- Univ. of Ill. Library, Urbana, Ill. 61803.
- Univ. of Md. Library, College Park, Md. 20740.
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- British Museum of Nat. Hist. General Library, London, S.W.7, England.
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ABSTRACT INDEX

(1949-1965)

Because of ever increasing interest in the marine sciences papers read at the annual meetings of the American Malacological Union and its Pacific Division are assuming proportionately greater importance as reference material.

Although thirty-one annual meetings of the American Malacological Union have been held, and seventeen by the Pacific Division, not until 1949 were abstracts of papers furnished by their authors to be printed in the annual report bulletins. It is to facilitate referral ease to these abstracts that the following chronological index has been compiled. A comprehensive author index begins on page 118.

1949

Fifteenth annual AMU meeting, Coral Gables, Florida, June 16-18; Elmer G. Berry, President. Pacific Division second annual meeting, Long Beach, California June 10-12; Chairman Ruth E. Coats unable to attend because of illness, Harry R. Turver presided.

- Bursa*, Florida species (J. MORRISON) 10
- Caracollus sagemon*, reproduction (RIVERO) 7
- Cooke, Charles Montague, Jr.—obituary (KONDO) 5
- **Crepidula*, taxonomy (S. BERRY) 22
- **Haliotidae*, world distribution (SORENSEN) 19
- **Haliotis rufescens*, reproductive study (CARLISLE) 20
- Hendersonia occulta* in Pennsylvania (MACMILLAN) 4
- *Gastropod fauna, Los Angeles County (GREGG) 24
- *Gastropoda, bilateral asymmetry (BAILY) 22
- *Japanese pearl culture (KEEN) 21
- Malacology, intraspecific units (AGUAYO) 8
- Malacology, Medical (E. BERRY) 13
- Mollusca, scarcity of generic names (AGUAYO) 2
- *Mollusks of West America, early records (HERTLEIN) 21
- **Monadenia* (EMERY CHACE) 20
- **Nemocardium*, phylogeny (KEEN) 20
- Schistosomiasis, molluscan control experiments (E. BERRY) 3
- **Vermetidae*, West American species (KEEN) 23

1950

Sixteenth annual AMU meeting, Chicago, Illinois, June 14-16; Fritz Haas, President. Pacific Division third annual meeting, Santa Barbara, California, April 7-9; John Q. Burch, Chairman.

- *Arizona land snails, collecting (GREGG) 24
- *Backyard conchology (WILCOX) 23
- *Brachiopoda, history (KEEN) 22
- **Clinocardium* (KEEN) 22
- Ellobiidae (J. MORRISON) 8

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- Freshwater mollusks, Illinois and Ohio (DEXTER) 11
 *Mollusks introduced into California (HILL) 20
 **Neverita* (EMERY CHACE) 26
 *Pearl oysters (HERTLEIN) 23
 **Placostylus* (EYERDAM) 21
 *Pleistocene fauna, Newport Bay (KANAKOFF) 25
 *Shell development, marine mollusks (SORENSEN) 19
Stenotrema hirsutum (C. B. LEE) 14
 Torre, Carlos de la—obituary (BARTSCH)
 Trip to Great Falls of the Potomac (MACMILLAN) 11

1951

Seventeenth annual AMU meeting, Buffalo, N. Y., August 22-24; Joseph P. E. Morrison, President. Pacific Division fourth annual meeting, Oakland, California, June 22-24; Leo G. Hertlein, Chairman. No abstracts were furnished.

- Cape Breton (Nova Scotia), collecting (MACMILLAN) 13
 Cerionidae, genetic analysis (ABBOTT) 10
 Freshwater mollusks, Lake Erie and Ohio River (DEXTER, SWART, DAVIS) 2
 Freshwater mollusks, world relationships (J. MORRISON) 6
Helisoma, anatomy study (MALEK) 5
 Land snails, North Carolina (DAWLEY) 9
 Malacological legislation (MEAD) 11
 Malacological trends (CLENCH) 1
 Naiad nomenclature (VAN DER SCHALIE) 4
 Niagara River Gorge, geologic history (SARGENT) 14
 Opisthobranchs (PILSBRY) 13
 Pholadidae (TURNER) 9
 Pleistocene gastropods (LEONARD) 4
 Robertson, Harold Ralph—obituary (HOFFMAN) 16
 Shell orchestra (MUSIAL) 11

1952

Eighteenth annual AMU meeting, Cambridge, Massachusetts, August 20-22; President, Jeanne S. Schwengel. Pacific Division fifth annual meeting, Los Angeles, California, June 20-22; Wendell O. Gregg, Chairman.

- Achatina*, wind orientation (CHAMBERLIN) 12
 **Achatina fulica*, possible natural control (EYERDAM) 29
 **Achatina fulica*, status quo (MEAD) 34
 Clausiliidae, West African (BEQUAERT) 15
 *Edible clams, conservation (FITCH) 31
 *Foreign mollusks in Arizona (MEAD) 30
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 Mactridae, trans-Panamic distribution (CHAMBERLIN) 10
 Malacological legislation (ABBOTT) 9
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 Mollusks of Atlantic and Gulf, distribution (PULLEY) 2
 *Mollusks of Baja California, distribution (W. EMERSON) 32
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- Nudibranchs, New England (G. MOORE) 6
- *Paleontological hoax (BAILY) 33
- Planorbidae (MALEK) 4
- *Pteropods, collecting (A. HOWARD)
- Shells as occupational therapy (M. MOORE) 15
- *Shell club organized (FOX) 31
- *Tertiary mollusk faunas (KEEN) 31
- William F. Clapp Laboratories (TURNER) 15

1953

Nineteenth annual AMU meeting, Lawrence, Kansas, June 25-27, A. Byron Leonard, President. Pacific Division sixth annual meeting, Asilomar, Pacific Grove, California, June 12-13. Chairman, Allyn G. Smith.

- Achatina fulica* as poultry feed (MEAD) 6
- Arizona, foreign mollusk introductions (MEAD) 11
- **Chlamydoconcha orcutti* (M. JOHNSON) 20
- **Conus* of Hawaii (GREEN) 28
- **Cypraea*, biology (OSTERGAARD) 21
- Detracia floridana*, eggs (J. MORRISON) 15
- **Donax gouldi*, resurgent population (COE) 18
- *Haliotidae, senility (TALMADGE) 29
- *Heteropods, Pacific Coast (A. HOWARD) 21
- *Lake Miragoane, Haiti, collecting (EYERDAM) 28
- Land mollusks, zoogeography (J. MORRISON) 12
- *Midway Island, collecting (SPICER) 25
- *Minute mollusks from Sonoran sand (S. BERRY) 21
- *Miocene molluscan fauna, Montana (S. BERRY) 23
- *Molluscan predators (SORENSEN) 18
- Mollusks of West Africa (BEQUAERT) 9
- **Mytilus californianus* (S. BERRY) 28
- **Ocenebra erinaceoides* (HERTLEIN) 29
- **Oncomelania nosophora*, reproduction studies (C. WONG) 19
- **Opisthoteuthis californiana* (S. BERRY) 29
- *Oyster culture, California (ORCUTT) 22
- *Paleoecology and marine mollusks (EMERSON) 26
- Paragonimiasis in British Cameroons (E. BERRY) 12
- **Partula gibba* (KONDO) 24
- Pleistocene mollusks (LEONARD) 5
- Robertson, Imogene S.—obituary (TESKEY) 1
- Schistosomiasis, West African snail hosts (E. BERRY) 7
- *Tahiti, collecting (ROBERTSON) 20
- *"The Universal Conchologist" (EMERY CHACE) 25
- "Treatise of Invertebrate Paleontology," progress report (KEEN) 8
- Types of F. C. Baker (FRANZEN) 10
- Zoogeography, land mollusks (J. MORRISON) 12
- *Zoology vs. paleontology—a critique (KEEN) 24

1954

Twentieth annual AMU meeting, Durham, New Hampshire, August 16-18; President, Joseph C. Bequaert. Pacific Division seventh annual

meeting, Los Angeles, California, June 18-19. Elsie M. Chace, Chairman.

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- *Cardiacea (KEEN) 26
 - Chattahoochee survey (CLENCH) 3
- *Conidae, systematica (ROBERTSON) 24
- **Cryptochiton stelleri* (S. BERRY) 22
- *Discontinuous distribution (W. EMERSON) 26
 - Elliptio complanatus*, variation (ATHEARN) 13
 - Freshwater mussels, gene exchanges (MCMICHAEL) 11
 - Gastropod fauna, Champaign County, Illinois (DEXTER) 1
 - Langford, Dan—biographical sketch (SCHWENGEL) 11
 - Linnaeus, binomial writer (DODGE) 4
 - Magnipelta mycophaga* (PILSBRY) 4
 - Melongena* (TURNER) 10
 - Mesodon ferrissi* (SOLEM) 2
 - Mission Bay (California) survey (R. MORRISON) 5
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1955

Twenty-first annual AMU meeting, Staten Island, New York, July 26-29, Morris K. Jacobson, President. Pacific Division eighth annual meeting, Stanford, California, July 15-16; Ralph O. Fox, Chairman.

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- Pollution problem in California (FITCH) 20
- Pomatopsis* in Michigan (VAN DER SCHALIE, DUNDEE) 22
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1957

Twenty-third annual AMU meeting, New Haven, Connecticut, July 16-19; Ruth D. Turner, President. Pacific Division tenth annual meeting, May 30-June 1, Santa Barbara, California. Edward P. Baker, Chairman.

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1958

Twenty-fourth annual AMU meeting, Ann Arbor, Michigan, September 2-6; Aurele LaRocque, President. Pacific Division eleventh annual meeting, Berkeley, California, June 27-29; Chairman, Albert R. Mead.

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1959

Twenty-fifth annual AMU meeting (listed in error on cover of bulletin as the twenty-sixth), Philadelphia, Pennsylvania, June 31–July 3, R. Tucker Abbott, President. Pacific Division twelfth annual meeting, Redlands, California, July 9–12; John E. Fitch, Chairman.

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1960

Twenty-sixth annual AMU meeting (listed in error as the twenty-seventh), Montreal, Canada, August 9-12; Katherine V. W. Palmer, President. Pacific Division thirteenth annual meeting, Asilomar, Pacific Grove, California, June 22-25; Chairman, Rudolf Stohler.

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1961

Twenty-seventh annual AMU meeting (listed in error as the twenty-eighth), Washington, D. C., June 19-23; President, Thomas E. Pulley. Pacific Division fourteenth annual meeting, Santa Barbara, California, June 28-July 1. Due to death of Chairman Howard R. Hill, Vice-Chairman Robert R. Talmadge presided.

- Acroloxus lacustris*, cytological aspects (J. B. BURCH) 15
- **Anatina anatina* (KEEN) 36
- Ancylids of North America (BASCH) 15
- *"Ariel" expedition (SHASKY) 34
- *Bivalve asymmetry reversal (BAILY) 35
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- *Haliotids, hybridization (OWEN) 34
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- Oxyloma retusa*, anatomical variations (FRANZEN) 16
- *Pelecypod oddities (KEEN) 38
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1962

Twenty-eight annual AMU meeting (listed in error as the twenty-ninth), St Petersburg, Florida, July 31–August 3; William K. Emerson, President. Pacific Division fifteenth annual meeting, Asilomar, Pacific Grove, California, June 27–30; Chairman, Robert R. Talmadge.

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- Caecidae, systematic position (D. MOORE) 6
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- *Chiton classification (THORPE) 30
- *Chiton fauna, Guadalupe Islands (A. SMITH) 27
- *Conidae, Indo-Pacific (KOHN) 27
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- *Indo-Pacific Conidae (KOHN) 27
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- *Prosobranch gastropods, handbook (MCLEAN) 28
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1963

Twenty-ninth annual AMU meeting, Buffalo, New York, June 18-21;
 Albert R. Mead, President. Pacific Division sixteenth annual meeting,
 Santa Barbara, California, June 26-29; Chairman, Crawford N. Cate.

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- Cocos-Keeling, Indian Ocean—collecting (ORR) 3
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1964

Thirtieth annual AMU meeting, New Orleans, Louisiana, July 21-24;
 President, John Q. Burch. Pacific Division seventeenth annual meet-
 ing, Asilomar, Pacific Grove, California, June 18-21; A. Myra Keen,
 Chairman.

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- **Arca*, fossil and Recent (ALLISON) 49
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- *Baja California, physical environment (GRADY) 48
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1965

Thirty-first annual AMU meeting, Staten Island, New York, July 19-23;
 Juan J. Parodiz, President. Pacific Division eighteenth annual meeting,
 San Diego, California, June 24-27; Chairman, Edwin C. Allison.

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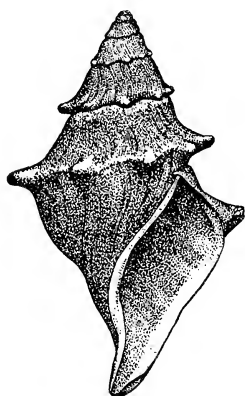
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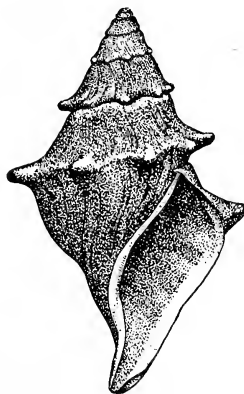
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AMERICAN MALACOLOGICAL UNION THIRTY-SECOND ANNUAL MEETING

Chapel Hill, North Carolina

August 22-27, 1966

They call North Carolina the Tar Heel State, Land of the Long Leaf Pine; of late it is the Scotch Bonnet State.* There may well have been earlier appellations but to those who attended the thirty-second annual meeting of the American Malacological Union North Carolina will always be the Hospitality State.

The North Carolina Shell Club meets four times each year and the 1965-66 quartet of meetings must have been devoted almost entirely to planning for invasion by the AMU. Seldom has this national organization enjoyed such a smoothly conducted meeting, never have its members been made to feel more welcome than at the University of North Carolina at Chapel Hill.

At least half of the 151 delegates (largest meeting in AMU history) arrived on Sunday to find an alert committee set up and waiting to register guests, issuing not only colorful name badges but passing out to each registrant a bulging bag of North Carolina products. These represented, among others, the textile, tobacco, wood, plastic and paper industries, and a nationally known drug company had donated not only packets of a familiar cough drop but provided an ample supply of seasick remedy for the scheduled mid-week dredging trip! All of these useful samples had been solicited from their manufacturers by the tireless members of the North Carolina Shell Club.

Delegates were shown to their rooms in Morrison Dormitory and were told that during the school year the ultra-modern ten story structure provides housing for 1,023 students. The lounge and meeting room reserved for use by the AMU were in the same building while a new and equally modern cafeteria was but a short walk away. It was with anticipation of the full days ahead that the early arrivals chatted away the evening.

Monday forenoon was given over to registration, then promptly at 2:00 o'clock AMU President Ralph W. Dexter called the meeting to order and introduced Dr. Charles E. Jenner, Chairman of the Department of Zoology, University of North Carolina.

Dr. Jenner began with an apology for the weather; it was, said he, the hottest series of days on record. He asked his listeners to ignore the heat and to concentrate instead on the beautiful little city of Chapel Hill which students and faculty members alike find to be an exceptionally pleasant place in which to live.

There is no industry; the town depends on the University for its existence. In 1792 a committee from Raleigh commissioned to select a site for a college chose perhaps the first wooded area they came upon. Approval was swift and in 1795 the new school opened its doors to the first students.

* In 1965 the North Carolina General Assembly enacted a bill sponsored by the North Carolina Shell Club whereby the official state shell was declared to be the Scotch Bonnet (*Phalium granulatum* Born). So the first of our fifty states now is represented by a shell which takes its place along with state birds, flowers and trees.

Marine biology studies began early under Dr. H. V. Wilson, best remembered for his basic studies of sponges. He was followed by Dr. R. E. Coker, a familiar name to most since he has published widely on mollusks. (Dr. Coker, now 90 and a resident of Chapel Hill was unable to attend the meeting because of ill health. Later in the week a small delegation of his former students called on the venerable gentleman and were graciously received. They carried the greetings and best wishes of the AMU.)

The zoology department, said Dr. Jenner, is expanding at a rapid rate with three new staff members added in the past year. Present emphasis includes ecology and with a transition of marine faunas occurring off the North Carolina coast opportunity of study and research in this field was never better. There are four marine laboratories within the Morehead City-Beaufort area, under auspices of the University of North Carolina, Duke University, and the U.S. Bureau of Fisheries.

As he concluded, Dr. Jenner introduced Dr. William J. Koch, Acting Chairman of the Botany Department. Dr. Koch's message was brief and to the point: "Our own facilities are right here; please use them."

Dr. Dexter replied to Drs. Jenner and Koch with the assurance that the welcome to the land of the Scotch Bonnet had been so very warm and sincere that along with his colleagues, he already felt at home. He had, said he, been a member of the AMU for thirty years and now felt especially honored to be serving as its chairman. Ecology is his field but with an especial interest in the mollusks, he finds meetings such as these to be of great value.

He then introduced James E. Wadsworth, Director of Housing of the University of North Carolina, remarking as he did so that it was because of Jim that the AMU was enjoying such fine housing and meeting facilities.

Mr. Wadsworth offered the services of the members of the North Carolina Shell Club who, identified by a bit of plaid (Scotch plaid, what else?) on their badges stood ready to help in any manner possible. He revealed that Dr. Jenner had volunteered to serve as projectionist for the meeting.

Mrs. Anna B. McCrary of the Wrightsville (N.C.) Marine Bio-Medical Laboratory was introduced and spoke briefly of having recently discovered new species of diminutive and highly modified bivalves living commensally on a large capitellid worm, *Notamastus lobatus*. Exhibits of the tiny clams and their hosts together with another unidentified species which lives with a brittle star had been set up at the rear of the hall and received much attention throughout the meeting.

The first paper introduced by President Dexter was entitled AN OBSERVATION OF CAPTIVE *MUREX CELLULOSUS* CONRAD by Dorothy Raeihle, New York Shell Club. (See page 28.)

This paper was illustrated with color slides made by Mr. George Raeihle. She used the blackboard to diagram the process of the deposit of egg capsules on the sidewalls of the aquaria.

The same process was observed in *Murex cellulosus* Conrad and *Cantharus multangulus* Philippi, wherein the egg capsule is passed through a temporary groove to a pedal gland for "finishing." (The process is well described in Fretter and Graham's discussion of the egg capsules of the Rachiglossa [British Prosobranch Molluscs, 1962, p. 413].)

Color slides were shown of *C. multangulus* egg capsules in three stages: 1) Transparent, spherical and without sculpture; aborted before it entered the pedal gland when the snail was handled. 2) Transparent, shaped; had been in the pedal gland only 12 minutes—was prematurely extruded when the snail was disturbed. These two cases disintegrated in two to three days, and were apparently of only one thickness of tissue. 3) The egg capsules which had been within the pedal gland for the normal time before extrusion (approximately an hour) were only semi-transparent, and when they disintegrated a few weeks later it was obvious that there were at least two layers of material in the walls of the capsules, more substance having been added to the capsules while within the pedal gland.

Schroth: "Are such little snails able to chew out of their capsule?"

Raeihle: "There seems to be a chemical process that softens the thinner 'hatch' area."

Question: "How long from the egg laying period is the hatching period?"

Raeihle: "About thirty days, with this species."

Question: "Do they hatch as veligers?"

Raeihle: "Only a few premature or imperfect; they did not survive."

Question: "As they hatch in the crawling state, does a colony remain in a limited area?"

Raeihle: "Yes, except that a percentage of the newly hatched swim at the surface of the water (as do most small specimens) and *could* be transported to nearby areas."

Lawrence: "How often do you change the water?"

Raeihle: "The small tanks containing as little as 4 ounces of water are changed anywhere from twice a day to twice a week, depending on need."

Question: "How large is the tank with the adult *Murex cellulosus*?"

Raeihle: "Pint-size."

Question: "During the period they did not add growth, did they cease feeding?"

Raeihle: "No, they fed normally."

The second paper was also by Mrs. Raeihle, EXPERIENCES IN THE CARE AND FEEDING OF SMALL MOLLUSKS. (See page 23.)

She observed that she would welcome a solution to the problem of shell erosion of some species, that she had experimented with and without algae, coral, sand, shell and in varying depths of water. Still there is erosion, a problem in common with other aquarists.

Lawrence: "How about using daphnia as food? In raising scallops I use that sold as tropical fish food, soaked first then dropped into the tank. And do you employ artificial sea water when the real thing isn't handy?"

Raeihle: "Never have tried it since I'm usually within reach of the ocean."

Question: "How do you control the balance of salinity when the water evaporates?"

Raeihle: "The small plastic containers I use have tight fitting lids that reduce evaporation almost entirely."

Question: "How do you filter the sea water you collect?"

Raeihle: "Immediately on bringing it in, I make a 'sandwich' of muslin with a pad of absorbent cotton as the filling; this is bound over the end of a plastic tube, dropped into a pail of sea water which is siphoned through the pad into clean glass or plastic jugs."

Abbott: "All this and much more is described in Dorothy's article in 'How to Collect Shells!'"

SIGNIFICANCE OF LARVAL DEVELOPMENT IN BIVALVE TAXONOMY, Paul Chanley, Virginia Institute of Marine Science. (See page 36.)
Projected drawings, photographs, graphs and charts illustrated this paper.

SNAILS ON MIGRATORY BIRDS, Dee S. Dundee, Louisiana State University in New Orleans. (No abstract furnished.)

Raeihle: "Is it possible for these transplanted snails to transmit disease?"

Dundee: "I don't know, but would suppose so, if they were infected."

Weingartner: "What was the snail you mentioned?"

Dundee: "*Succinea unicolor*."

Raeihle: "What is its normal food?"

Dundee: "Fungus, I believe."

Morrison: "Over geological time, birds have transported certain snails. Hawaii has two Lymnaeid genera that are endemic. (A third, accidentally introduced about 1900, is now abundant and is the intermediate host of the cattle fluke on the Islands.) These endemic Hawaiian freshwater snails are relatives of the North American types. They undoubtedly were brought in, very early, by such birds as the golden plover that migrates to and from Alaska."

Question: "Why are these snails always found hidden under the bird's feathers?"

Morrison: "Simple! Other snails that may have started out on the birds could in flight be shaken or blown off the feet and outer feather surfaces."

Teskey: "Dr. Bartsch had very strong convictions on the subject of mollusks being transplanted by birds. Few of these meetings passed when he didn't tell of such incidents."

The final feature of the first session of opening day was a familiar one: SMALL BEGINNINGS, Adlai B. Wheel of the Syracuse, New York Boys' Club.

Eighteen years ago, said he, he first spoke to an AMU audience of his early and abiding interest, the adolescent boy and his need for guidance that will shape his future.

This time he pictured with color slides his own sanctum, The Captain's Cabin, and some of the young friends who come to view the wonders it holds for them.

Captain Wheel concluded by displaying, with justifiable pride, a plaque awarded to him by the Boys' Clubs of America in recognition "of his long and fruitful service on behalf of the boys of Syracuse, New York."

The AMU Executive Council met before the dinner hour, and in the evening the first informal session was called to order by Mr. Paul Jennewein, President of the North Carolina Shell Club.

Mr. Jennewein introduced Mr. and Mrs. John B. Proetz of Boynton Beach, Florida who presented, via movies and sound track, a most beautiful series of rare shells from the collection of Paul and Tom McGinty.

MALACOLOGICAL MUSINGS, 1966 EDITION was the printed title of the next feature, but Mr. Jim Wadsworth whose annual scandal sheet reports on the antics of his staid fellow delegates explained that on this occasion the time had been too short and he himself too busy to observe much misconduct. "Another year!" he promised.

Two illustrated talks by Dr. Charles Jenner occupied the remainder of the evening.

The first was a further presentation, via color slides much magnified, of the commensal clams announced earlier in the day by their discoverer, Mrs. Elizabeth Anne McCrary.

The second theme was his own study entitled AGGREGATION AND BEHAVIOR PATTERNS OF *NASSARIUS OBSOLETUS*. (No abstract furnished.)

Beautifully illustrated by color slides, these locality and environmental studies pictured an unbelievably dense "flock" of the familiar mud snails as they live out their life's cycle on the mud flats of Barnstable Harbor on Cape Cod. Many of the scenes were aerial views and Dr. Jenner remarked that he was most likely a pioneer in the business of hunting snails with an aeroplane.

* * *

Tuesday morning began with a muster on another part of the spacious campus for a group photograph. Then a shuttle bus ride back to Morrison Dormitory and its welcome air conditioning.

Shortly after ten o'clock President Dexter rapped his gavel to introduce the first paper, EVOLUTIONARY SEQUENCE IN *PHYLLODINA*, by Kenneth Jay Boss, Museum of Comparative Zoology. (See page 21.)

Slides illustrating evolutionary development from Miocene and Eocene species to Recent accompanied this paper.

GENETIC AND ECOPHENOTYPIC RELATIONSHIPS IN NORTHERN *ANODONTA* POPULATIONS, Arthur H. Clarke, Jr., National Museum of Canada. (See page 24.)

Dr. Clarke employed drawings of beak sculpture, graphs relating measurements to geographical and ecological factors, then color slides of the specimens themselves.

Morrison: "I agree that the relationship of the Western American (W. slope drainages) *Anodonta* to the European species was correctly stated by Hannibal, in 1912. The Newfoundland species, similar to the *Anodonta grandis* complex of Eastern America, belongs rather to the subgenus *Pyganodon* of Crosse and Fischer 1894. To my knowledge, *Anodonta suborbiculata* and the *A. imbecilis* complex are the only Eastern American species of typical *Anodonta* [s. s.]"

Clarke: "The beak sculpture of *Anodonta cataracta fragilis* from Newfoundland consists of numerous, prominent, irregular concentric ridges. This is similar to the beak sculpture of the *A. kennerlyi* and the *A. cygnea* complexes. *A. suborbiculata* and the *A. imbecilis* group have only a few, weak, irregular ridges on their umbones and their beak sculpture is not similar to the Pacific Watershed anodontas. *Pyganodon* and other subgenera of *Anodonta* described by Crosse and Fischer are based on superficial characters of doubtful phylogenetic significance."

Boss: "Isn't *Anodonta cataracta* Say doubly looped? If so, how can *A. c. fragilis*, which is singly looped, be considered a subspecies of it?"

Clarke: "Nevertheless *A. c. fragilis* does intergrade with *A. cataracta* [s. s.] in Eastern Canada and the two taxa apparently are not reproductively isolated. Furthermore, in New York State *A. cataracta* intergrades with *A. grandis* and apparently hybridizes with it. The whole genus *Anodonta* in North America needs careful study and revision."

OBSERVATIONS ON THE HABITAT DISTRIBUTION OF THE NAIAD *CUMBERLANDIA MONODONTA* (SAY), David H. Stansbery, Ohio State Museum. (See page 29.) Specimens via color slides and from old plates were shown to illustrate this paper.

Morrison: "Life history studies indicate that the glochidium of this species has a trout host. Is the adult found in trout water?"

Stansbery: "*Cumberlandia* is found almost exclusively in clear cold streams in either the Cumberland or Ozark Plateaus. While coldness and clearness are characteristics of trout streams I am not certain whether or not trout are found at any of our recent collecting sites. Here we need the help of the ichthyologists."

Boss: "Is it monotypic?"

Stansbery: "Yes, Say's *monodonta* is the only species in the Genus *Cumberlandia*."

Dundee: "Will it live on exotic or planted trout?"

Stansbery: "I don't know. So far as I know *Cumberlandia* has never been found naturally or artificially as a glochidium on any species of fish."

Dundee: "Is it possible the hellbender is co-host? For we've taken this species from waters harbouring the hellbender!"

Stansbery: "This is certainly an interesting possibility well worth looking into. *Simpsoniconcha ambigua* has the mud puppy, *Necturus*, as a host so perhaps *Cumberlandia* has the hellbender *Cryptobranchus* as a host. We have taken hellbenders from several *Cumberlandia* streams."

Morrison: "Have you made life history studies? What size is the glochida?"

Stansbery: "I haven't made a special effort to study the life history; I've never seen the glochidium but earlier workers recorded it as small, sub-elliptical and without spines—like *Margaritifera* and the species of your Family Amblemidae."

LYMNAEIDAE OF WESTERN MONTANA—TAXONOMY AND DISTRIBUTION, Richard H. Russell, University of Montana. (See page 26.)

Mr. Russell employed a projected distribution map of the Montana area together with slides illustrating the species.

Raeihle: "How cold does it get there, what's the range?"

Russell: "From about -30° to over 100° F. The water temperature varies from freezing to about 70° F in some waters.

Franzen: "Do you consider only shell characters or study soft parts as well?"

Russell: "Both genitalia and shells have been considered."

Jenner: "Is this definite or like politics, depending on many factors?"

Russell: "Generic and specific separations depend upon the weight one gives to the differences between groups."

Jacobson: "I've seen specimens Baker named from that area; they really floored me."

Russell: "Yes, it's a problem to determine valid species."

Clench: "The whole group is most complex; out of about 1800 world Lymnaeidae Hubendick has boiled them down to about 40 species. He really uses the axe; I suppose it simplifies our studies."

Jacobson: "Hubendick suggests that generic names be retained as subgeneric names."

Russell: "Most of the genera I've studied seem to be fairly clear cut."

Question: "Is there much variation in individuals of a single population?"

Russell: "There is a considerable degree of variation in any sizable population."

Franzen: "What about chromosome studies?"

Russell: "Burch has established a haploid number of 17 or 18."

Franzen: "Using Hubendick's groupings, how many species would there be in Montana?"

Russell: "About seven."

INDO-WEST PACIFIC LITTORINIDAE, Joseph Rosewater, U.S. National Museum, Washington, D.C. (Read by title; see page 27.)

Mrs. Kay Lawrence of the Boston Malacological Club was introduced and she instructed and entertained with her brisk presentation entitled COMMERCIAL SCALLOPING, ANYONE? (See page 19.)

This was a series of slides some of which were furnished by the Bureau of Fisheries and accompanied by a running commentary by Mrs. Lawrence. From the opening close-ups of a dredging boat from bow to stern, the rigging, dredges, the hauling operation and finally to shucking and packaging it was a most interesting feature. The mollusk fished on this occasion was *Placopecten magellanicus*, the deep sea scallop.

Porter: "Here in North Carolina (Beaufort) scallop fishing is quite different; we work four days each week the year around and shuck ashore instead of at sea; our commercial scallop is *Pecten irradians*. The industry is relatively new, it has been established for only a year or so. Our beds are spotty, hard to locate. But scientific knowledge is aiding us."

Merrill: "The Bureau of Fisheries has published information available to all dredgers."

Root: "Off Ft. Pierce (Florida) they located a bed of *Pecten gibbus* 200 miles long. A fleet of dredgers started up when, suddenly, overnight, the bed disappeared!"

Edwards: "Back to the sea scallop dredging; if they shuck at sea and dump the shells right back over the beds, won't they be bringing up as many empty shells as live?"

Lawrence: "I never heard it discussed so I guess it can't be a real problem."

Continuing in the same vein was the next paper, SHELL REPAIR IN THE SEA SCALLOP, *PLACOPECTEN MAGELLANICUS*, Arthur S. Merrill, Bureau of Commercial Fisheries (see page 35.)

Color slides of aberrant scallop shells illustrating self-repair of both natural and man-made injuries accompanied this paper.

Clarke: "How long does it take the mollusk to repair a crack in its shell?"

Merrill: "About two to six weeks; since this is a common injury we feel that detailed study is important."

Weingartner: "Such a repaired shell contains an edible mollusk?"

Merrill: "Yes."

Question: "In making such repair does the mollusk employ aragonite?"

Merrill: "Mostly calcite; the scallop shell is largely made up of calcite."

Lawrence: "I've noticed that the repair patch is colored deep purple only when the shell being repaired is an especially dark brown."

Hicks: "In some other species injuries are healed so the repair is almost unnoticeable."

Merrill: "Give the sea scallop time and he does a neat job too!"

* * *

Lunch break here, then the following four papers finished out the day:

OYSTER PRODUCTION AND RESEARCH IN TAMPA BAY, Lulu B. Siekman, St. Petersburg Shell Club. (Abstract not submitted.)

UTILIZATION OF NAIADS BY PREHISTORIC MAN IN THE OHIO VALLEY, David H. Stansbery, Ohio State Museum. (See page 41.)

Slides portrayed Recent and fossil species and then a series of mussel shells adapted for use as crude tools, utensils and ornaments.

Jenner: "Prehistoric man must have relished mussels as food besides using their shells. Have you ever eaten freshwater mussels?"

Stansbery: "Yes. They're chewy and taste like the water they came from."

Parodiz: "Don't you find marine shells in these mounds?"

Stansbery: "Yes indeed, lots of them. There seems to have been brisk trading with the coastal tribes."

Herrington: "In similar mounds in Ontario there seem to be only freshwater species—but I've only started my studies there."

Clarke: "There is much material for study at the Royal Ontario Museum."

Clench: "In Russell's Cave (Alabama) there are rich deposits of Pleuroceridae, always with broken spires. We know the early Indians had poor

teeth so most likely they broke off the spire to suck out the contents of the shell."

Jacobson: "In South America *Pachychilus* is cooked with a hot sauce; it's delicious!"

Dr. Albert R. Mead of the University of Arizona had been forced to cancel plans to attend the meeting; his scheduled paper was read by title: AEROMONAS IN THE PATHOLOGY OF THE GIANT AFRICAN SNAIL. (See page 19.)

The final paper of the day was that of Royal Bruce Brunson of the University of Montana, ZOOGEOGRAPHY OF MONTANA MOLLUSKS. (See page 43.)

This paper was accompanied by a series of beautiful mountain scenes, habitats of Montana snails and bivalves.

Upon conclusion of this paper and following a brief recess, President Dexter called to order the annual business meeting.

Reading of the minutes of the 1965 business meeting was waived since proceedings had been printed in the annual report bulletin.

The annual report of the AMU secretary was heard:

The fiscal year of 1965 ended with AMU membership at 738 individual members of which 214 were registered under the joint or family plan. 16 held paid life membership, 5 were honorary life members, Dr. S. Stillman Berry remained the only honorary life president; there were 20 persons and institutions holding corresponding membership. 35 shell clubs were AMU affiliates in 1965, three others have since been added. 159 members residing in the western United States and temporarily in the Eastern Pacific were automatically registered as members of the AMU, Pacific Division.

During 1965, 106 new members joined the AMU; 7 were lost by death, 13 resigned, and 76 dropped for delinquent dues. Although not properly to be covered in this report, in the first six months of 1966, 80 new members have joined the AMU, a figure that presages a record year for membership.

634 copies of the 1965 Annual Report Bulletin were mailed to members in February at a per copy cost of \$2.56. This figure, higher than in any previous year, was due in part to seventeen extra pages being required for the indexes of authors and their abstracted papers from previous annual meetings.

On a happier note, in May 1966, the revised edition of How to Collect Shells came off the press. Dr. R. Tucker Abbott and Karl Jacobson assumed the entire responsibility for compiling the revision and arranging for printing, while Tony D'Attilio and George Raeihle collaborated on the attractive cover.

1158 copies were printed for \$1236.90 of which four pages of paid advertising will absorb a goodly percentage. At \$2.00 per copy, then, the AMU should benefit nicely from this third edition; already \$354 in sales has been turned over to the treasurer.

788 letters requesting information on all phases of malacology were received and answered in 1965.

Finally, the secretary reminds the Council and fellow members that her services on their behalf are greatly curtailed in January, February, and March; all mail accumulating during these months is answered, but not at all promptly.

Respectfully submitted,

Margaret C. Teskey, Secretary

This report approved as read.

In the absence of the treasurer, her annual report was read by the secretary:

**THE AMERICAN MALACOLOGICAL UNION, INC.
REPORT TO THE COUNCIL FROM THE TREASURER,
AUGUST 1, 1966**

At the 1965 annual meeting the Council authorized the treasurer to "employ such professional aid as may be required." In the belief that an annual audit is good business practice and helpful to an organization as well as to a treasurer, I asked the Auditing Committee to name an auditor. They suggested Mr. Russell Archerd, who will audit the 1966 books following completion of the annual financial report.

Donations to the AMU are now tax exempt. The Internal Revenue Service, upon inquiry regarding the identification number of the savings account, advised that the AMU seek tax exempt status—a move which had previously been approved by the Council. The application was prepared, submitted and approved.

Five members paid Life Membership dues, increasing that fund by \$300.00.

The savings account remains where it was placed by the former treasurer. The interest has been raised to 5¼% from 4.9%. Interest earned during the first two quarters of 1966 is \$86.21.

The checking account was placed in a San Francisco bank which made no service charges, even when checks were sent to foreign countries for collection.

Delinquent members total 180. A considerable reduction is expected by the time the membership list is prepared for the 1966 AMU Annual Report.

Regarding the Third Edition of "How to Collect Shells," receipts include advertising \$416.00 and sales \$426.35, total \$842.35. Costs include printing \$1,236.90, postage \$52.50 and insurance \$48.00, total \$1,337.40. When future income less expenses net \$495.05 the edition will have paid for itself.

The rental of an adding machine, authorized by the Council at the 1965 meeting, is \$39.00 per quarter, beginning March 10th. The rental can be applied on a purchase if the Council so decides.

Following is the report of cash on hand:

Savings Account, General Fund	\$1,826.31	
Life Membership Fund	1,330.88	\$3,157.19
Checking Account, Secretary		104.53
Checking Account, Treasurer		315.21
		<u>\$3,576.73</u>

Rising printing and mailing costs indicate that a raise in dues may become necessary.

I have had the advantage of taking office when the fiscal condition was sound and the records in fine condition. It has been a pleasure to work with the former treasurer, Jean M. Cate, and the secretary, Margaret C. Teskey. The Auditing Committee was helpful in times of decision and I wish to stress the importance of this committee to the treasurer and to the AMU. The cooperation and friendliness of officers and members contribute much to my regret that it was necessary to notify the president, Dr. Ralph W. Dexter, that I could not accept if nominated again, due to plans for a change of residence.

Respectfully submitted,

Mae Dean Richart, Treasurer

Since this report was addressed to the Executive Council and had received approval from that body, no action was taken. See page 46 for itemized financial report.

The secretary reported on the action taken by the Executive Council on August 22; the Council had:

Heard and approved Minutes of previous Council meeting;
Ratified proposed revision of Pacific Division Bylaws (see page 58);
Accepted with regret the resignation of the current AMU treasurer;
Approved a motion that the round trip (San Francisco-Chapel Hill) air fare be paid to the retiring treasurer as a token of her efforts on behalf of the AMU;
Accepted the invitation of Dr. Arthur H. Clarke that the 1967 AMU meeting be held in Ottawa, Canada;
Heard and gave unanimous approval to the slate prepared by the nominating committee;
Adjourned.

Chairman Abbott of the nominating committee read the following slate of candidates for 1966-67:

President, Leo G. Hertlein
Vice-President, Arthur H. Clarke, Jr.
2nd Vice-President (Chairman, AMU Pacific Division), Gale G. Sphon, Jr.
Secretary, Margaret C. Teskey
Treasurer, Mrs. H. B. Baker
Publications Editor, M. Karl Jacobson
Councillors-at-Large, J. Frances Allen, Emile A. Malek, William E. Old, Jr., Robert Robertson

It was moved from the floor, seconded and carried that the secretary be instructed to cast one ballot for unanimous election of the slate as read.

The 1966 annual business meeting was adjourned.

* * *

The evening festivities had been billed as Shell Club Night but might more properly have been call Shell Night. Those who filled the lounge following dinner found shells on all sides. The loaned collections of shells in cases were to be inspected and admired throughout the meeting, but the baskets, boxes and bushels of shells to be exchanged or later to be auctioned were everywhere.

Enjoying the evening program and expressing amazement that the world contains such bewildering variety of beautiful shells was a prominent resident of Chapel Hill, best remembered by the oldsters in the crowd as the Old Professor of the College of Musical Knowledge, Mr. Kay Kyser.

Master of Ceremony Carl C. Withrow called the assembly to order, then introduced Mr. Tom Walker of the Water Resources of North Carolina; explaining that he was representing North Carolina Governor Moore he spoke for that gentleman in welcoming the AMU and its members to the Land of the Long Leaf Pine. He expressed his own appreciation of the local group's successful efforts in bringing so many visitors to the State.

Mr. Withrow asked representatives of the various shell clubs to report briefly on their group activity. Every shell club east of the Mississippi save one, as well as several in Texas and in St. Louis, was represented by one or more delegates and their reports were as varied as their addresses.

All save the North Carolina Shell Club hold monthly meetings (the NCSC being statewide meets four times each year) and activities range from issuing publications to arranging shell displays for civic functions, donating and arranging collections for permanent display in public buildings, giving talks to school children, maintaining lending libraries for club members and promoting knowledge by use of a question box and shell-of-the-month discussions. The Sanibel Shell Club has compiled and published a Code of Ethics dedicated to conservation, and the Pittsburgh Shell Club continues to act as clearing house for collectors desirous of making foreign exchanges.

Most of the Florida and some of the Texas clubs sponsor annual shell shows which are well attended by winter visitors. Mr. Flynn Ford announced that an association of Florida shell clubs is being planned and that interested persons have already held a pre-organizational meeting at Clewiston, Florida.

"Jensonia" which followed was a sparkling series of slides depicting mollusks and their shells as Nature never made them. The combo of D'Attilio, Jensen, Jacobson, and Raeihle (all of the New York Shell Club) has collected models of mollusks constructed of every imaginable media—papier-maché glass, china, metals, even of ivory in scrimshaw design. Some are humorous, some exquisite and beautiful, all extremely interesting and worthy of another showing at a future meeting. Arrangement and photography was, as the title stated, the work of that talented team, Norman and Dorothy Jensen.

Drawing for several door prizes followed, then the shell auction for which the persuasive talents of Mr. Karl Jacobson were employed. When the noisy affair was over, scores of donated shells had new owners. By the same token

any lingering fears of deficit by the North Carolina group was dispelled since proceeds were earmarked to cover the inevitable meeting expenses.

Wednesday was field trip day. Some seventy persons had chosen to make the long trip to the coast, planned there to split into two groups. One would be transported to sea aboard Duke University's research vessel Eastwind, to witness such dredging operations as weather might permit. The remainder of the crowd planned on making a ferry trip to Cape Lookout, to beachcomb and perhaps glimpse the famed wild ponies of the island.

Announcement that all making the coastal trip would be served breakfast at 6:00 prior to departure brought startled reaction but surprisingly enough, no cancellations.

Those choosing to do land and freshwater collecting under the guidance of Dr. Charlotte Dawley and Mrs. Dorothy Beetle were allowed the bonus of an extra hour's sleep but by 8:30 they too had departed and Morrison Dormitory was quiet and a bit forlorn.

Late in the afternoon this party was back, toting prizes in the shape of mussels and land shells. It was much later, nearing midnight, when the bus bearing the coastal trippers pulled up to the dorm and a weary, happy crowd stumbled out, relating tales of high seas, mal de mer, cancelled ferry schedules—all made unimportant by the conviviality of the bus trip home.

Although little collecting had been done, one happy soul had recovered from a pile of dredged scallops two prizes—living specimens, one each, of *Oliva sayana* and *Xenophora conchyliophora*.

These having survived the night in a pail of sea water were put on display in the cafeteria for Thursday's breakfasters to view. Few of those who crowded around ("Don't jiggle the pail. See, your shadow sent him back into his shell!") had seen these living animals although well acquainted with the shell. Lucky for the AMU that North Carolina scallop dredgers shuck ashore.

* * *

This morning it was apparent that the heat wave was definitely over. Delegates were still comparing notes about yesterday's field trips when Dr. Dexter called the meeting to order and introduced the first paper.

SYSTEMATICS AND ZOOGEOGRAPHY OF THE CTILOCERATIDAE,
Donald R. Moore, Institute of Marine Science, University of Miami. (See page 40.)

Dr. Moore projected line drawings from old plates, illustrating the species and morphological characteristics.

Jenner: "What's the habitat?"

Moore: "We can't be sure since they've never been seen alive. I would like to be able to say they feed on diatoms, but again, just can't be sure."

Brunson: "We found living *Caecum* near the Duke laboratory at Beaufort."

Moore: "Yes, they're worldwide."

Schroth: "What's the size of your subject species?"

Moore: "From one to four millimeters."

ZOOGEOGRAPHY OF THE FAMILY AMBLEMIDAE, Joseph P. E. Morrison, U.S. National Museum. (See page 43.)

An extensive series of color slides of worldwide Amblemidae illustrated this paper.

Question: "Where are the shells processed to form the cultured pearl nuclei?"

Morrison: "I don't know. A few years ago, the commercial attache of the Japanese Embassy asked us where, outside the U.S.A., they could get thick freshwater mussel shells to grind into "starters" for the cultured pearls. We told them perhaps in South America; Chinese shells were not known to be available in commercial quantity."

Question: "Are pearl buttons still being manufactured?"

Morrison: "Yes, but probably only from Ocean pearl shells. Blanks cut from the Pearl Snail *Trochus*, and the Pearl Oyster *Pinctada margaritifera*, are thinner and/or flatter, and so require less grinding to finish as more perfect buttons."

Comment: "I understand there is a large button cutting operation in Lebanon.

Morrison: "If so, they are undoubtedly processing Ocean Pearl shells there."

Comment: "The price of freshwater pearl shell has gone sky high; everything is being sent to Japan."

Morrison: "Yes. Just a few weeks ago I saw several tons of the thick and wavy 'three-ridge' shells, that were previously not considered worth buying for buttons, awaiting shipment from the Illinois River town of Meredosia."

Parodiz: "Don't the extremely heavy U.S. shells, and the heavy-shelled Asiatic genera indicate a case of parallel development?"

Morrison: "This may be considered as a parallelism on the two continents, but it is more than that; the animals are definitely the same."

Question: "When and where did these freshwater mussels originate?"

Morrison: "I don't know. They started a long time back, in my opinion. There is an extremely old fossil *Trigonia* from China that is a 'dead-ringer' for a living *Lamprotula* species from the Yangtze River, except for the middle of the hinge."

Clarke: "There is a difference of opinion; I do not agree with the way you 'interpret' the type species. I have requested a *nomen conservandum* action by the International Commission to preserve the name *Amblesma* as we are using it today."

RAISING OF *SEGMENTINA HEMISPHERULA* (BENSON) FOR THE STUDY OF FASCIOLOPSIASIS, Chin-Tsong Lo, University of Michigan. (See page 34.)

This paper was illustrated with projected life cycle charts, graphs of survival rate of snail and miracidia, photographs of cultural procedure and of habitat.

Schroth: "Are infected water chestnuts safe to eat when cooked?"

Lo: "Yes, if boiled for only one minute they are safe."

Mrs. H. B. Baker: "Doesn't the government of Formosa do anything about this problem?"

Lo: "No!"

Weingartner: "Why not drain these ponds and kill off the snails?"

Lo: "That is ineffective; they can hide and survive for long periods."

Malek: "How do you feed these experimental snails with the trematode eggs?"

Lo: "Snails are put into the dish containing the eggs for a few minutes."

Malek: "Did you try to put the eggs on filter paper when feeding snails?"

Lo: "No, but it would seem to be a good idea."

Malek: "You are sure then that the eggs are eaten?"

Lo: "Yes, it can be observed under a microscope. Eggs are passed out in the feces of the snail later, and exact number of the eggs can be counted."

THE SPECIES GROUPS OF AFRICAN *BULINUS*, S. S., John B. Burch and Rajah Natarajan, University of Michigan. Read by Natarajan. (See page 39.)

Distribution maps, line drawings of species and their anatomical characteristics accompanied this paper.

Jenner: "Were the copulatory organs used in making your determination of species?"

Natarajan: "I must say yes, but in a very restricted sense. Only the presence or absence of penis was used as a distinguishing character."

Jenner: "Could you make this determination without sacrificing the animal? That is, is it necessary to dissect the snail?"

Natarajan: "It is necessary to dissect the animal to make this observation."

SOME IMMUNOLOGICAL RELATIONSHIPS IN THE AFRICAN GENUS *BULINUS*, John B. Burch and Gene K. Lindsay, University of Michigan. Read by Lindsay. (See page 37.)

Color slides pictured the equipment used, procedure and charted results.

Schroth: "How many snails did you use in this study?"

Lindsay: "Up to 400 snails to make an antibody and around 10 to 20 to prepare an antigen for test."

Graus: "How many proteins are there in the tissues you are working with?"

Lindsay: "Electrophoresis of this group yields around twenty protein fractions. I wish to point out though that antibodies are produced only to half a dozen or so of the most conservative large proteins."

Clarke: "There are several North American groups which would be interesting to look at using this technique; are you planning to do work with any of these?"

Lindsay: "We are giving our attention now to medically important species although we have started work on the Lymnaeidae group. As time becomes available we do plan to work with our own North American groups."

Clarke: "Do you use specimens preserved in alcohol as well as fresh?"

Lindsay: "We use fresh material exclusively."

Clarke: "At Woods Hole they find they can use alcohol specimens. And do you use the whole snail or one specific tissue?"

Lindsay: "We use only foot tissue. Alcohol denatures protein so completely that it is of no use in our particular type of test."

Graus: "Is it possible that two species could have the same proteins?"

Lindsay: "Since proteins are genetically determined building blocks of a species, then it follows that if two species had the same protein structure they would have the same genetic structure and both species in question would in fact have to be the same species. In the immunological studies, though, we are looking only at the more conservative proteins, which means that we are usually placing species into species groups of similar properties."

PROGRESS IN SURF CLAM RESEARCH, Robert M. Yancey, U.S. Bureau of Commercial Fisheries. (See page 33.)

This paper was accompanied by maps, charts of population densities, reproductive cycle, pictured dredging operations and of the species under discussion.

Stansbery: "In making growth studies, do you consider rings as being annual?"

Yancey: "Sorry, I can't answer that; we're taking that study up later."

Mason: "What is the average size of these clams?"

Yancey: "From 150 mm through 180, 185 mm; some monsters reach 200 mm."

Weingartner: "How old is a marketable clam?"

Yancey: "I'd guess about five years."

Root: "How about transplanting populations from high to low mortality areas?"

Yancey: "That wouldn't be practical; we might be trading one problem for another."

Merrill: "In working on this study we marked 30,000 specimens and planted them in 70 feet of water; later we couldn't recover a single one!"

HERMAPHRODITISM IN THE SURF CLAM, *SPISULA SOLIDISSIMA*, John W. Ropes, U.S. Bureau of Commercial Fisheries Biological Laboratory. (See page 26.)

At this point President Dexter announced that an effort would be made to conclude the entire program of papers during the remainder of the afternoon session. This was accomplished, though the usual questions and comment were curtailed.

SOME NUDIBRANCH NAMES, Henry D. Russell, Dover, Massachusetts. (See page 38.) In the absence of Dr. Russell this paper was read by William J. Clench.

It was beautifully illustrated by color slides and as Dr. Clench concluded he remarked that a related set of slides of the Australian Barrier Reef might be obtained on loan from the Australian Embassy.

POPULATION SEXUALITY IN *ANODONTA* (PELECYPODA: UNIONIDAE), William H. Heard, Florida State University. (See page 31.)

A map, anatomical drawings and charts of morphological studies illustrated Dr. Heard's paper.

PRELIMINARY REPORT ON A STUDY OF THE NAIADS OF THE ILLINOIS RIVER, William C. Starrett and Gerald Roat, Illinois Natural History Survey Laboratory. Read by Starrett. (Abstract not submitted.)

FREEZE-DRYING AS A STANDARD METHOD FOR TOTAL SOLIDS IN SHELLFISH, William N. Shaw, Haskell S. Tubiash, and Allan M. Barker, U.S. Department of the Interior Fish and Wildlife Service Bureau of Fisheries Biological Laboratory, Oxford, Maryland. Read by Shaw. (See page 24.)

Mr. Shaw employed graphs, charts and photographs of the freeze drier in explaining his title.

SALINITY TOLERANCE AND DISTRIBUTION OF *SPISULA SOLIDISSIMA*, *MULINIA LATERALIS*, AND *RANGIA CUNEATA* (FAMILY MACTRIDAE), Michael Castagna and Paul Chanley, Virginia Institute of Marine Science. (See page 35.) Paper read by Castagna.

Slides were shown depicting laboratory equipment used and method of operation, then graphs of the natural and experimental ranges.

ON THE IDENTITY OF *SPISULA SIMILIS* (SAY), Morris K. Jacobson and William E. Old, American Museum of Natural History, New York City. Mr. Jacobson had been called away from the meeting because of a death in his family; his paper was read by title. (See page 30.)

LAND AND FRESHWATER MOLLUSKS FROM THE OUTER BANKS OF NORTH CAROLINA, Dorothy E. Beetle, Charlotte (North Carolina) Children's Nature Museum. (See page 27.)

This was a series of slides depicting the barrier islands of North Carolina's jutting coastline and the molluscan (and other) creatures to be found there. It was an interesting presentation and a fitting conclusion to the afternoon and the academic portion of the meeting.

* * *

In the evening the annual dinner, always a highlight of these AMU meetings, was held in the ballroom of the Carolina Inn, a beautiful and gracious hostelry owned by the University and situated at the edge of the campus.

There shortly after six o'clock gathered over one hundred malacologists-turned-merrymakers. The social hour, courtesy of the North Carolina Shell Club, erased the cares of a busy day and the banquet that followed was one of the most unique in AMU history.

The mood was set as each diner found his place and donned the plaid tam-o'-shanter (Scotch bonnet, for this occasion) beside his plate. The tables were embellished with long strips of the same gay plaid and made festive by arrangements of shells with the State's long leaf pine. At each place was a souvenir specimen of the shell-of-the-week, a Scotch bonnet. The plaid "bonnets" were the handiwork of the ladies of the North Carolina Shell Club who had solicited the material from the local textile mills, then sewed them in their homes.

The meal of stuffed Cornish game hen was delicious and at its conclusion President Dexter rose and introduced the AMU past presidents, the AMU officers and their ladies occupying the head table, and finally Mr. Jim Wadsworth, the hardworking spark plug whose organizational talents had been exercised to their utmost over the past few months.

He in turn presented Mr. Paul Jennewein, President of the North Carolina Shell Club who presented the remainder of the club's officers.

Mr. Wadsworth named members of the local committees, mentioning as he did so the particular part each had played in making and executing plans for the meeting. Mrs. Kay Lawrence rose to voice her own appreciation and in response to her suggestion, the entire assemblage stood to tender the traditional big hand for a job well done.

Once again and for the final time the familiar screen and projector were set up, this time employed by Dr. Dexter who took as theme for his presidential address, E. S. MORSE AS A MALACOLOGICAL ILLUSTRATOR, WITH NOTES ON HIS HANDWRITING. (See page 21.)

As he concluded his chronicle of the 19th century malacologist whose drawings were as exquisite as his handwriting was abominable, Dr. Dexter introduced Dr. R. Tucker Abbott.

Dr. Abbott spoke with great affection of his teacher, colleague and friend, Dr. William "Bill" Clench who retired in August from his position as curator of mollusks at the Museum of Comparative Zoology at Harvard University. On that occasion over a hundred of Dr. Clench's friends had sent letters to his office which were bound and presented to him. It was from among these letters that Dr. Abbott read several bearing greetings from as far away as Australia and the Solomon Islands.

In response, Dr. Clench regaled his listeners with tales of his early collecting days in the moonshine areas of the deep and the not-so-deep South.

The evening was drawing to a close and Dr. Dexter, in retiring from his presidential chair, introduced the newly elected and re-elected officers "who will guide the destiny of the AMU for the next twelve months."

In the absence of President-elect Leo G. Hertlein, Vice-President-elect Arthur H. Clarke accepted the gavel, as he did so inviting everyone to attend the 1967 meeting in his home town, Ottawa, Canada.

Upon this note, the annual dinner was over, but the rakish plaid headgear was to be seen about the campus and perhaps in other parts of the town for some hours to come.

* * *

Friday was the final day of the meeting and a relaxed and restful day it was. Many of those living at a distance departed to add the extra day to their weekend of travel while those who remained were still entertained by the indefatigable North Carolina Shell Club whose members acted as guides to the parts of the campus and town the visitors might not as yet have seen.

The fine University library received its share of AMU visitors and in the used book department of a local book store some lucky browsers made interesting purchases. The extensive arboretum was an appreciated stop on the guided tour, then in the evening the stars came out right on schedule to be viewed in all their mysterious splendor from Morehead Planetarium.

And so the thirty-second annual meeting of the American Malacological Union became history. Over a third of a century has passed since a handful of malacologists convened in Philadelphia to probe the feasibility of meeting each year to discuss their science. It was gratifying when on the recent occasion an informal group of younger but no less dedicated scientists were overheard to speak with unanimous approval of the value of the AMU. "This is my number one meeting," said one, and the rest nodded in agreement. And so say we all.

ABSTRACTS AND CONDENSED PAPERS READ AT THE 1966 ANNUAL MEETING, AMERICAN MALACOLOGICAL UNION

AEROMONAS IN THE PATHOLOGY OF THE GIANT AFRICAN SNAIL¹

ALBERT R. MEAD, W. W. DEAN, E. S. KOJIMA, L. Y. ICHINOSE
University of Arizona, Arizona State University, University of Hawaii

A zoologist, bacteriologist and virologist are continuing investigations of the etiology, epizootiology and histopathology of a syndrome in the giant African snail which appears to be the expression of an enzootic disease intensified by extrinsic and intrinsic stress factors resulting in population decline and often decimation. A field examination of the fungus associates of this snail was conducted in Oahu, Hawaii, and although 459 isolates were made, consisting of 22 fungus genera, none was significantly associated with the diseased snails. The bacterial associates were explored over a two year period and the pseudomonad *Aeromonas liquefaciens* was demonstrated to be involved to a statistically significant degree. This bacterium has not yet been shown to be the etiological agent of the observed disease syndrome; but at the very least, it is involved as a potent and perhaps decisive secondary invader. It elaborates an endotoxin lethal both to snails and mice. The subject of the much disputed possible antibody formation in invertebrates has formed a prominent aspect of the present investigations, including the use of fluoresceine isothiocyanate conjugate techniques. The ground-work has been laid for the exploration of a possible viral etiology through successfully establishing tissue cultures of *Achatina fulica* on modified basic media and introducing tissue homogenates from infected snails.

COMMERCIAL SCALLOPING

KAY LAWRENCE
Falmouth, Massachusetts

It is a long and expensive trip from the ocean floor to the dining room table for the deep sea-scallop, *Placopecten magellanicus* (Gmelin).

When about 50 boats of the scalloping fleet are tied up alongside the commercial piers, each one equipped with a tremendous amount of gear, seemingly scattered all over the decks and hanging from the mast and booms drying, the general appearance is a mass of confusion.

Many scallop areas are known and fished from the St. Lawrence to the Virginia Capes. The fleets from New Bedford have been going to the Georges Bank, working between the 20 and 50 fathom curve on these grounds, which are located almost due east of Cape Cod.

Scallop draggers usually stay at sea about 8 to 10 days, of which 7 days are spent dredging, hauling, shucking and storing the catch, the remainder of the time is allotted for traveling to and from the scallop grounds.

¹ This research was supported by NIH grants AI-01245-06 and AI-01245-07 and NSF grant GB-2463.

During a week of scalloping the boat is a beehive of activity day and night. The boats are equipped with spotlights, so that around the clock scalloping can be maintained.

The commercial scallop boat looks like most fishing boats seen along the Atlantic coastline, with the exception of the general rigging. The scalloper has attached to the main mast, forward, two booms, each slanting away forming a "V" shape. Some of the newer vessels are equipped to do both scalloping and fishing, by simply changing to the proper gear necessary for the particular job.

Most scallopers use two dredges, each one about 11 feet wide. These are towed together, one from each side of the boat and are hauled and dumped alternately onto the decks. These big "dredge-rakes" as they are called, are constructed of heavy metal ring links. Each ring measures about three inches in diameter, and is of sturdy construction, because of the rough bottom terrain and the great depths they must drag. A dredge this size weighs, when empty, about 1,500 pounds.

There is a general, but no specific design for a dredge-rake, as each boat owner has his own ideas on what makes for efficient gear, hence he modifies the basic design to suit his boat, since not all draggers are the same size.

A heavy metal tow line is used for each dredge and a powerful winch hauls the loaded dredges aboard. The haul is then dumped onto the decks and the men cull out the scallops, shoveling the debris back overboard.

Shucking is the next step. The sea scallop, a bivalve mollusk, grows to the size of an average butter-plate, about 6 to 7 inches across, and because of the natural design does not close its valves tightly. Therefore it cannot retain water within the valves. In a short time the animal dies. Hence it is necessary to open or "shuck" the scallops as soon as they are hauled at sea. The shucker cuts away the top shell and the "gut" section and tosses it overboard, leaving only the edible part, the large adductor muscle known in the commercial trade as the "eye." When a container is filled, the scallops are scooped out, dumped into stainless steel vats where they are washed down with fresh sea water, put into unbleached muslin bags, drained to get rid of excess sea water and then stored below decks and covered with crushed ice.

After the 10 day trip the scalloper returns to port and the scallops are sold at auction. Buyers for the local and out of town plants come to the port docks to bid on them.

I have tried to give an extremely brief accounting of what is involved on a commercial scalloping trip, but I feel the picture would not be complete without an explanation of the costs of owning and operating a commercial vessel.

A 90-foot wooden commercial scallop dragger costs to build today between \$150,000 and \$200,000, and should net annually approximately \$200,000 worth of scallops. However the yearly operating expenses on a vessel this size are considerable: supplies, insurance, taxes, miscellaneous union dues, and wages cost approximately \$247,000 and many trips over many years must be made before a decent profit can be made for captain and/or boat.

Acknowledgments:

Octavio A. Modesto, Gen'l Mgr. Seafood Producers Ass'n of New Bedford.
The New Bedford Standard Times Newspaper.

Bureau of Commercial Fisheries at Woods Hole, Mass.

Arthur Merrill, Bureau of Commercial Fisheries, Oxford, Maryland.

PRESIDENTIAL ADDRESS: E. S. MORSE AS A MALACOLOGICAL
ILLUSTRATOR, WITH NOTES ON HIS HANDWRITING

RALPH W. DEXTER

Kent State University, Kent, Ohio

(ABSTRACT)

As a young man Edward Sylvester Morse (1838-1925) developed an interest in natural history, collected shells especially, and combined his studies of zoology with artistic talent. Before he was 20 years of age he was a curator at the Portland (Maine) Society of Natural History, described his first new species of land shell, and read his first paper on mollusks before the Boston Society of Natural History. Following four years of study under Louis Agassiz at Harvard College, Morse established himself as a "Zoological Draughtsman." He made illustrations for the publications of many malacologists. After joining the staff of the Peabody Academy of Science at Salem, Massachusetts, he made many of the illustrations as well as the cover design for the *American Naturalist* founded by the Salem group. Some of his correspondence concerning his career as a scientific artist was read.

Morse often gave illustrated lectures on natural history during which he displayed skill in ambidextrous drawing on the blackboard. In this he emulated Agassiz. It is generally agreed that such skill is developed by left handed persons who acquire use of the right hand, and hence can use both hands simultaneously with equal facility.

In spite of his skill as an illustrator for publications, his ambidextrous drawings for public entertainment, and his equal use of both hands, his handwriting was a miserable "hen-scratch." His colleagues and friends, as well as professional correspondents, complained, some bitterly and some humorously, of Morse's handwriting. Many of the comments, some of which have become classic, were read. (The full paper will be published in the Essex Institute Historical Collections.)

EVOLUTIONARY SEQUENCE IN *PHYLLODINA*
(BIVALVIA: TELLINIDAE)

KENNETH J. BOSS

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(ABSTRACT)

Phyllodina was established by Dall (1900a) for those species of the genus *Tellina* characterized by a shell which possesses equidistally spaced, well developed, shelf-like, anterior and posterior lateral teeth in the right valve and which has an obliquely rising, dorsally flattened, short and narrow pallial sinus, normally connected to the anterior adductor muscle scar by means of an interlinear scar. The group is further typified by a rather smooth, later-

ally flattened prodissococonch, a pointed umbo, and concentric sculpture which may be subfoliate dorsally and variously intercalated on the right posterior dorsal slope.

In the Recent fauna of the New World, two species are found in the Western Atlantic and two in the Eastern Pacific. *Tellina squamifera* Deshayes (1855), the type-species of *Phyllodina*, lives in offshore waters at depths from 10–100 fathoms from Cape Hatteras, North Carolina south to the Florida Keys and into the Gulf of Mexico as far west as Texas and northern Mexico. *Tellina persica* Dall and Simpson (1901) occurs from Matanzas, Cuba south through the Antilles to Tobago and west along the coast of northern South America to Colombia. It occupies a niche in the deeper offshore waters from 30–50 fathoms. In the Pacific Ocean, *Tellina pristiphora* Dall (1900a) is found in various substrates from the Gulf of California to Costa Rica in depths of 10–158 fathoms, while *T. fluctigera* Dall (1908), originally considered allopatrically distributed in the south from Panama to Peru, now has been found north as far as the Gulf of California (Parker, 1963). It lives in clay bottoms from 20–75 fathoms.

Thus, the Recent species of *Phyllodina* are typically offshore dwellers which generally prefer relatively soft substrates on the intermediate or outer shelf zones. Each major geographic realm has two species, allopatrically distributed in the Atlantic and sympatrically in the Pacific. A comparison of each reveals a phylogenetic pattern in which the northern species, *squamifera* and *pristiphora*, and the southern species, *persica* and *fluctigera*, form separate lineages and constitute species-pairs or what have been called analogous species.

A number of Tertiary species belong to *Phyllodina* and to the lineages of the Recent forms. The earliest recognizable precursors are from the middle Miocene. In the Miocene or at the upper Miocene–Lower Pliocene interface, all four lineages were already present. In the Eocene, two species, *T. cynoglossa* Dall (1900b) from the Chickasawan of Wood's Bluff, Alabama, and *T. linifera* Conrad (1865) from the Jacksonian at Enterprise, Mississippi are referable to the subgenus *Tellinella*, but bear, in addition, a distinct resemblance to *Phyllodina* and appear to have been the early Tertiary ancestors of both subgenera.

In the Neogene, the distinct lineages were already developed. *Tellina lepidota* Dall (1900b) from the middle Miocene sandstone of the Gatun Stage in Panama and Costa Rica and an unnamed species in the late Miocene at Tehuantepec, Mexico represent the lineage of *T. pristiphora*. *Tellina leptalea* Gardner (1928) of the Shoal River formation of the Alum Bluff of middle Miocene age is a direct precursor of *T. squamifera*. *Tellina dodona* Dall (1898; 1900b) of the Oak Grove Formation, Alum Bluff Group precedes *T. leptalea* in the geological column and represents a line of descent close to that of the *pristiphora*–*squamifera* lineage which, though widely distributed in the Miocene (Perrilliat Montoya, 1963), became extinct. Again, in the middle Miocene, *T. halistrepta* Dall (1900b) of the Bowden Formation is the earliest known precursor of the modern *T. persica*. An unnamed species in late Miocene of Limón, Costa Rica, and *T. francisca* Olsson (1964) from the Esmeraldas formation of later-Miocene–early Pliocene age at Punta Gorda, Ecuador complete the lineage of *T. persica*. The line of descent for *T. fluctigera* includes *T. phragmites* Olsson (1964), a fossil species of the

later Miocene and early Pliocene of the Esmeraldas formation at Quebrada Camarones, Ecuador.

The fossil evidence indicates that *Phyllodina* evolved from *Tellinella*-like ancestors found in the Eocene. During Oligocene and early or lower Miocene times, the stem element of *Phyllodina* diverged from the basic tellinellid stock and separated into northern and southern lineages, which by the middle Miocene became effectively isolated to form the basic differentiated stocks of the four Recent species.

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EXPERIENCES IN THE CARE AND FEEDING OF SMALL MOLLUSKS

DOROTHY RAEIHLE
New York Shell Club

The mollusks that have adapted best to our shallow water aquaria are intertidal species found at low tide either completely out of water or in the shallows. Transporting them from the field, glass or plastic containers have been found best, as there is an unfavorable reaction when sea water comes in prolonged contact with metal. The mollusks should not be crowded, and should not be "drowned"—sea water just to cover them is sufficient.

In the aquaria, those mollusks found out of water on rocks have been supplied with hygroscopic stones or pieces of coral rock that extend well out of water yet remain damp. This is important also with minute or newly hatched specimens that, not having the natural conditions of a rising tide or of a splash zone, tend to climb out of water and die of desiccation.

A supply of their natural food should be brought home with the mollusks. When the food is unknown, try to determine what it might be by observation in the field. In the case of *Murex cellulosus* it was noted that there were many small mussels (*Brachidontes exustus* Linné) on the same rocks—this proved a good guess. When the supply of *B. exustus* had been consumed the *M. cellulosus* fasted for about a week before they accepted our local *Mytilus edulis*. Similarly, six-month-old *M. cellulosus* born in captivity and raised on *Mytilus edulis* had to get good and hungry before they accepted *B. exustus*.

In spite of their growth and survival (14 months to date) the shells of those *M. cellulosus* born in captivity are not in as good condition as the shells of the field-collected parent stock which have been in captivity 21 months. This would seem to indicate a lack in the diet of the young ones (in addition to the stress of the artificial conditions of captivity) as other species (*Prunum apicinum*, *Nerita*, *Neritina* and *Puperita*) have grown sturdy and beautiful shells under the same conditions.

As these aquaria are far too small to accommodate a filter, care has always been taken to change the water promptly if there is any indication of fouling. They are kept at room temperature which indoors in New York compares with the outdoor range of approximately 58°-90°F in the Florida Keys. However, as the snails seem to do best around 80°F, during recent heat waves of 90+ to 101°F it was necessary to cool them. The dozen small plastic aquaria were stacked and covered with a wet bath towel which was then dotted with ice cubes. The result was that the snails were more comfortable than we were—aquaria temperatures remaining at a satisfactory 80-84°F.

FREEZE-DRYING AS A STANDARD METHOD FOR TOTAL SOLIDS IN SHELLFISH

WILLIAM N. SHAW, HASKELL S. TUBIASH, AND ALLAN M. BARKER

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Bureau of Commercial Fisheries Biological Laboratory

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(ABSTRACT)

Lyophilization or freeze-drying is being used at this laboratory to determine the percentage of solids (dry weight of meat divided by wet weight of meat, times 100) of shellfish. This method is simpler and faster than conventional oven drying.

In parallel analysis over a 1-year period, the freeze-dry technique (12 hours to process) and the oven-drying technique (24 to 48 hours to process) have given similar results. Other methods of determining the condition of oysters are discussed and evaluated.

Because diverse procedures are being used to measure oyster condition, it is suggested that the freeze-dry technique be established as the standard method.

GENETIC AND ECOPHENOTYPIC RELATIONSHIPS IN NORTHERN *ANODONTA* POPULATIONS

A. H. CLARKE, JR.

National Museum of Canada, Ottawa

(SUMMARY)

Recent collections by the writer and others have shown that *Anodonta* occurs throughout most of Canada south of the tree line. This includes even the Mackenzie Delta close to the Arctic Ocean. Extreme inter- and intra-

population variation exists and the taxonomy of the species involved has been unsatisfactory.

An attempt has been made to resolve the taxonomy of *Anodonta* within the Hudson Bay and Arctic watersheds and to provide criteria for recognizing genetic and ecophenotypic effects. The same procedure was used which has been adopted by the writer in revising all groups of freshwater mollusks within the region, viz.: (1) statistical analysis of representative population samples from as many areas within the region as possible to determine the variability of all characters which appear significant or which have been used by other workers to differentiate species and subspecies; (2) consideration of these results in relation to aspects of ecology and to post-Pleistocene climatic changes and drainage history; and (3) revision of taxonomy based on these considerations.

Direct examination of soft parts within this closely related group was not revealing but analysis of shell characters, especially those demonstrably related to anatomy, gave interesting results. Statistical analysis was done of approximately 10,000 measurements from 34 population samples collected from localities spread over the whole region. Nearly 100 smaller population samples were also examined qualitatively. The most important results obtained, to be published later in detail, are given below.

1. Based on differences in (a) beak sculpturing, (b) relative position of the umbones with respect to length and (c) relative obesity, two subspecies and a separate species of *Anodonta* are recognized within this region. They are designated as *A. grandis grandis* Say, *A. g. simpsoniana* Lea, and *A. kennerlyi* Lea.
2. *A. g. grandis* occurs throughout the Winnipeg River, Red River, Lake Winnipegosis, and Saskatchewan River watersheds of the Nelson River System from western Ontario to central Alberta and from South Dakota to central Saskatchewan. It also occurs in parts of the Churchill River System in central Saskatchewan.
3. *A. g. simpsoniana* occurs from north-central Quebec to central Alberta and the Mackenzie River Delta. In western Ontario and the Prairie Provinces it is found north of the region occupied by *A. g. grandis* and it intergrades freely with that subspecies in the zone of contact.
4. Within *A. g. grandis* and *A. g. simpsoniana*, populations from large lake-sandy substrate habitats exhibit greater anterior shell development than populations from other habitats. This is interpreted as resulting from physical selection for individuals with large relative foot volumes, individuals better able to maintain their position without dislodgement in unstable sediments in exposed habitats.
5. In the *A. grandis* group, greenness of periostracum, expressed as the percent of individuals exhibiting green or greenish color, is positively correlated with the presence of mud in the substrate. Greenness also appears to be correlated with high densities of aquatic vegetation or possibly with high concentrations of vegetational decomposition products or of plant detritus in the substrate.
6. In the *A. grandis* group, some direct correlations also were seen between high degree of periostracal darkness and river habitats containing various substrata. Conversely, lake habitats with sand substrata produced the

palest colored individuals. Mud or sand substrata (but not mixed mud and sand) produced the greatest frequency of rayed specimens in the populations examined.

7. *Anodonta kennerlyi*, previously recorded only from west of the Rocky Mountains from California to British Columbia, also occurs in central Alberta east of the Rocky Mountains.
8. Based on their unique beak sculpture and on general shell morphology, *A. kennerlyi* of western North America appears to be related to *A. cygnea* L. of Eurasia and to *A. cataracta fragilis* Lam. of extreme eastern Canada. Their joint distribution is much like that of the *Margaritifera margaritifera* (L.) group and both may have been controlled by similar circumstances.

HERMAPHRODITISM IN THE SURF CLAM, *SPISULA SOLIDISSIMA*

JOHN W. ROPES

U.S. Department of the Interior, Fish and Wildlife Service
Bureau of Commercial Fisheries Biological Laboratory
Oxford, Maryland

(ABSTRACT)

A single hermaphroditic surf clam, *Spisula solidissima* (Dillwyn), was found among 2,500 clams collected to determine the seasonal reproductive cycle in the mid-Atlantic bight. Standard histological techniques were used to prepare stained sections of all gonads for detailed microscopic examination. Unlike the normally dioecious gonad condition, the hermaphroditic specimen contained clearly distinguishable testicular and ovarian alveoli with developing germ cells of both sexes. The rarity of hermaphroditism in the surf clams is discussed in relation to this condition in other pelecypods.

LYMNAEIDAE OF WESTERN MONTANA

RICHARD H. RUSSELL

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(ABSTRACT)

A survey was made of the family Lymnaeidae of Montana west of the Continental Divide. The taxonomy, ecology, and distribution are reported, using essentially the classification systems of F. C. Baker (1928). Four genera and twelve species are included. These are:

Lymnaea stagnalis (Linné)
Radix auricularia (Linné)
Stagnicola palustris (Müller)
S. binneyi (Tryon)
S. elrodiana Baker
S. elrodi Baker & Henderson

S. caperata (Say)
S. montanensis (Baker)
Fossaria dalli (Baker)
F. parva (Lea)
F. modicella (Say)
F. obrussa (Say)

INDO-WEST PACIFIC LITTORINIDAE

JOSEPH ROSEWATER
Division of Mollusks

U.S. National Museum, Washington, D.C.

(ABSTRACT)

Zoogeographic data for Indo-West Pacific species of the genus *Littorina* have been compiled from collections in the major museums in the continental United States and Hawaii. These data indicate that certain species have restricted ranges and are endemic in certain areas, whereas other species are widely distributed throughout this faunal region. *Littorina glabrata* is limited to the shores of the Indian Ocean, extending as far eastward as Ceylon; *L. decollata* and *L. knysnaensis* are South African species; *L. mauritiana* occurs on Mauritius, Madagascar and small islands in that vicinity. *Littorina melanostoma* and *L. carinifera* occur in southeast Asia, the East Indies and Philippines. *Littorina scabra scabra*, the nominate subspecies of the *L. scabra-angulifera* species complex, lives throughout the Indo-Pacific region from East Africa to the Society Islands and Hawaii, and shows a preference for shore vegetation or wood pilings. *Littorina unifasciata* occurs only in Australia, while *L. cincta* and *L. oliveri* are endemic in New Zealand. *Littorina coccinea* and *L. undulata* range widely through the Pacific Islands although the latter occurs westward into the Indian Ocean and appears sporadically in Madagascar. *Littorina pintado*, originally described from Hawaii, also occurs on the islands of the Pacific and westward to Madagascar, Mauritius and East Africa, but apparently is absent from shores of southeast Asia. *L. pintado schmitti* appears on Clipperton Island, closer to the East Pacific province.

It is doubtful that any one factor can explain this variety of distributional patterns. Species' ranges are dictated by ecology, manner of reproduction and larval distribution, temperature, pattern of ocean currents, and probably other factors. Little of this information is known about Indo-Pacific Littorinidae. What is known often contradicts expectation. The most widely ranging species, *L. scabra*, occupies a somewhat restricted habitat and reproduces ovoviviparously. *Littorina coccinea*, which occupies a rather generalized shore habitat on coral or rock and produces a planktonic egg capsule, is limited to the Pacific basin and the Cocos-Keeling Atolls. Gaps in distribution, such as those displayed by *L. pintado* and *L. undulata* may point up more extensive ranges during past geologic time, since the family dates from the Jurassic. Examination of fossil Littorinidae from Indo-Pacific deposits may supply answers to some questions. However, the present study is planned primarily to elucidate the classification, zoogeography and biology of the Recent species.

MOLLUSKS OF THE OUTER BANKS, N.C.

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(ABSTRACT)

The Outer Banks of North Carolina, a chain of long, narrow sand bars protecting the coast, exhibit three major habitats: dunes, interior flats and

salt marshes, each with its characteristic vegetation. Associations are largely determined by resistance to salt spray injury and toleration of tidal flooding.

The islands of the Outer Banks are formed from sands and clay beds of the Atlantic Coastal Plain which has been accumulating sediments at intervals since the Cretaceous. Their outlines change under the force of wind and wave action and they are currently being moved inland. Fresh water occurs in these beds and reaches the surface along this island chain in ponds and short creeks that flow into the sound.

Collections of mollusks in the Outer Banks yielded 17 land and 3 fresh water species. This is opposed to the approximately 35 land and 73 fresh water species of clams and snails found currently on the coastal plain. Two species, previously unreported, were found along the coastline. It is believed that the present molluscan assemblage is a remnant of the previous total that moved in with the forest as the seas withdrew during the Pleistocene glaciation.

AN OBSERVATION OF CAPTIVE *MUREX CELLULOSUS* CONRAD

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Illustrated with color slides by George Raeihle

Several specimens of *Murex cellulosus* Conrad were collected in November of 1964 from the old coral rock which lines the Florida Bay shore of Bonefish Key, in the Florida Keys. Eight specimens became adapted to captivity and are still living in an aquarium with shallow sea water.

The first egg capsule was deposited in February of 1965, then in April, during a three week period, one female deposited 35 egg capsules. In February of 1966 a second female was received from the Keys; the two females deposited a total of 90 egg cases in the six month period, January-July 1966, with the greatest number of them in the months of March, April and May.

The egg capsules were shaped like a shallow teacup, 3 mm across the rather flat, circular face in which was centered the thinner "hatch" area through which the eggs could be observed.

The creamy, spherical eggs averaged 7 per capsule. Cleavage was apparent after 19 hours; the very early veliger became active at 8 to 9 days; shell could be discerned by 14 days—then eye spots and two very small velar lobes. The velar lobes reached their largest size in from 18 to 22 days and remained so until two to three days before hatching when they steadily diminished in size, disappearing completely before the crawling snail emerged from the capsule. The majority of the young were hatched 29 to 31 days after the deposition of the egg capsule.

The newly hatched *Murex cellulosus* ranged in size from 1 mm high \times 0.66 mm wide to 1.25×1 mm. They remained quiet on a piece of coral rock until the 6th day when they started to feed, drilling live bivalves.

Growth rate varied with individual specimens: At $7\frac{1}{2}$ to 8 months the 21 surviving specimens, all hatched during a three week period, varied in size from 5.5 mm high to 15 mm. At this age they entered a 4 month rest period, adding no more growth until around the first of May. By mid-June, when all had reached fully one year, the largest had grown to 18 mm.

At 14 months of age there is no evidence of maturity.

OBSERVATIONS ON THE HABITAT DISTRIBUTION OF THE *NAIAD CUMBERLANDIA MONODONTA* (SAY, 1829)

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(ABSTRACT)

Efforts to build a naiad research collection at the Ohio State Museum have led to the employment of almost every reasonable method of obtaining series of all available species from nature. Satisfactory series of the common or more widespread species have been readily obtained in our stream survey work. Species having restricted ranges or specialized habits, however, have been found only through persistent searching. Some of these rarer species have yet to be found and some may well be extinct.

Early in our collecting a search was made for *Cumberlandia monodonta* (Say, 1829), the Spectacle-Case Mussel of the clammers. It was not to be found in the Ohio River proper nor in the lower reaches of several of its larger tributaries where it had been commonly taken half a century before. The first evidence that it was still among the living species was the collection of several fresh, dead shells from the Clinch River in western Virginia. All accessible naiad habitat in the vicinity of these finds were searched thoroughly for living specimens but without success.

Several years later *Cumberlandia* was found in numbers at a site on the Gasconade River in the Ozark Plateau of Missouri. Here most of the specimens were found in a verticle position in the rather firm mud around the roots of a bed of eel grass, *Vallisneria americana*. While there was a rushing current only a matter of a few inches to a foot away all specimens were found in the relatively quiet shallow water of the bed of eel grass. The only other specimens of *Cumberlandia* at this site were found imbedded in the firm mud between large boulders adjacent to the rapid current of a chute. In both habitats the species was imbedded up to 80% of its length in firm mud, in quiet water, very near rapid water. Although many hundreds of living mussels were observed in the firm sandy-gravel substrates of the nearby runs and riffles, no *Cumberlandia* were found outside the two microhabitats mentioned.

Collecting in 1965 in the Stones River of the Cumberland system revealed *Cumberlandia* in the firm mud beneath boulders in fast water. Here again all specimens found were immediately adjacent to the main current and imbedded in very fine sediments. This same summer the upper Clinch River was systematically collected from its several origins to the head of Norris Reservoir. Dead shells of *Cumberlandia* were rare or absent until the Kyles Ford station was reached. Although many living naiads were found, no living *Cumberlandia* were seen until its particular habitats were collected. The species was found living in numbers in the mud between boulders adjacent to a rapids and in the mud which had accumulated in the slack water beneath individual boulders midstream in the riffles.

The size of some aggregation of *Cumberlandia* is impressive. Although the area of the microhabitat occupied may be surprisingly small, the number of individuals may reach a density of well over a dozen per square foot. A mud-filled crack between boulders may be literally stuffed with this species and a

single double handful from a selected spot in the Gasconade River habitat yielded 18 individuals.

Over the past decade we have collected living specimens of *Cumberlandia monodonta* from the Gasconade, Clinch, Stones, Green, and Tennessee rivers. With the exception of the Tennessee River specimens, which were taken with a crow-foot dredge, all living specimens were found:

- a) imbedded in fine sediments, usually a firm mud.
- b) in relatively quiet water in beds of vegetation or down in protective cracks between boulders.
- c) very close to (but never quite in) rapids or turbulent water of some description.

The above facts, considered in the light of the fragile shell of this animal, makes the habitat(s) described very logical. Here apparently is a naiad which requires highly oxygenated (or low carbon dioxide) water and yet cannot survive when exposed directly to the viscissitudes of a rocky torrent. While species such as *Lastena lata* (Raf.) and *Leptodea leptodon* (Raf.) have "solved" this problem by burrowing in the riffle substrates, *C. monodonta* occupies a marginal habitat between standing and rapid water. Thus do they benefit from the advantageous characteristics of two diverse environments.

ON THE IDENTITY OF *SPISULA SIMILIS* (SAY)

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Previous attempts to establish the identity of *Macatra similis* Say have led to varying conclusions. On the basis of the present study we feel that this taxon refers to a form of *Spisula solidissima* Dillwyn.

For *Macatra similis*, Say (1822, 309) clearly referred to a small shell, "one and three-twentieth inches long and one and two-fifths inches wide," and he compared it to *Macatra solida* L., a European species with a small, solid shell. We have noted that some immature shells from the coast of New Jersey are unusually heavy and have a thickened "internal disk" (i.e., the internal area limited by the inner margins of the muscle scars, the pallial line, and the pallial sinus), imparting the appearance of mature shells. We believe that it was to this form that Say applied the name *similis*. Unfortunately Say's type material is not now present in the collection of the Academy of Natural Sciences of Philadelphia. Nor was Gould able to locate the types there in 1841 (p. 52).

Most northern records of *S. similis* that have appeared in the literature evidently refer to submature specimens of *S. solidissima* (Say). Among these have been the records of DeKay (1843, 230); Johnson (1934, 55); Jacot (1919, 92); M. Smith (1951, 65); Jacobson (1943, 142); and Abbott (1954, 446).

The name *similis* Say has also been applied to another species. These populations have shells that are larger and heavier, and range from Virginia southward to the Gulf of Mexico. Conrad (1831, 61) briefly referred to such a shell when he described *Macatra solidissima reveneli* (sic), a *lapsus calami* for *raveneli*, which was noted by Dall (1894, 26). When commenting on *solidissima*, Conrad stated, "It is unknown on the coast south of Virginia, or at

least never attains more than half the size, if it be the same species; it is, however, supposed to be distinct; it is more elongated than *M. similis*, and occurs on the coast of New Jersey, in company with the present species. The name *reveneli* [sic] might be applied to it, as Professor Ravenel, of Charleston, first detected the difference between it and the *solidissima*."

Aside from Conrad's questionable reference to a New Jersey occurrence, we feel his taxon sufficiently diagnosed by mention of the smaller size, the southernly distribution, and the reference to the shape of the shell. The southern population of *similis* auct., non Say, 1822, should, in our opinion, be called *Spisula raveneli* (Conrad), 1831, with the type locality (here designated) Charleston, South Carolina. We feel that the southern populations are distinct enough to warrant specific recognition. See Perry, 1940, pl. 17, fig. 114.

We suggest the following synonymy for these taxa:

Spisula solidissima (Dillwyn), 1817

Mactra solidissima Dillwyn, range north of Virginia

Mactra similis Say, 1822, pathologic (?) forms from New Jersey

Spisula solidissima similis Auct. non Say, submature forms of *S. solidissima*.

Spisula raveneli (Conrad) 1831

Mactra reveneli (sic) Conrad, 1831 = *raveneli* Conrad, ranging south of Virginia

Spisula solidissima similis Auct. non Say, when referring to southern populations.

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POPULATION SEXUALITY IN *ANODONTA* (PELECYPODA: UNIONIDAE)¹

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Members of the freshwater mussel genus *Anodonta* have served as the subject of numerous reproductive studies. Of special significance are the observa-

¹Supported, in part, by grant 26-036 (1963-1964) from the Florida State University Research Council.

tions of Sterki (1898, Nautilus, 12), Ortmann (1911, Mem. Carnegie Mus., IV), and van der Schalie and Locke (1941, Occ. Pap. 432, Univ. Mich. Mus. Zool.) on several Nearctic species, and Bloomer (1930, 1934, 1935, 1936, 1939, 1940, 1943 and 1946; Proc. Mal. Soc. London, Vols. 19, 21, 21, 22, 23, 24, 25 and 27, respectively) on several Palearctic species.

Most unionids are dioecious, and hermaphroditism, which most frequently occurs in the subfamily Anodontinae, is uncommon. This monoecious state has been reported, for example, in the Nearctic *Anodonta grandis*, *A. henryana* and *A. imbecilis*, and in the Palearctic *A. anatina* and *A. cygnea*. Individuals of separate sexes have been reported for *A. anatina*, *A. complanata*, *A. cygnea*, *A. grandis* and *A. imbecilis*. Recent histological studies of *Anodonta* in the southern United States have demonstrated *A. couperiana* and *A. gibbosa* to be dioecious, while *A. hallenbecki* and *A. peggyae* contain males, females and hermaphrodites. Only females and hermaphrodites were found in *A. imbecilis*.

Variation between different populations of the same species may occur in the sexual conditions present. Bloomer (1939) reported that one population of *A. cygnea* contained males, females and hermaphrodites, while another had only females and hermaphrodites; a third contained only hermaphrodites. Sterki and Ortmann considered *A. imbecilis* to be "normally hermaphroditic," while Utterback (1915, Amer. Midl. Nat., 4) listed males and females for this species.

Ortmann, in discussing *A. cataracta*, *A. grandis* and *A. imbecilis*, described morphological differences between (a) all the gills of the male and the inner gills of the female, and (b) the outer gills of the female. The latter, which carry the glochidial larvae and are termed marsupial, possess during the seasons of gravidity secondary septa which transversely divide each water-tube into three chambers. In addition, the primary septa of the marsupial gills are comparatively close together. The male gills and the inner female gills, none of which are marsupial in *Anodonta*, lack secondary septa and display more distantly-spaced primary septa. Bloomer has supported these observations with similar investigations of *A. anatina* (1936), *A. complanata* (1939) and *A. cygnea* (1934).

Bloomer also reported two types of hermaphrodites in *A. cygnea*: those in which the outer gills were marsupial and those in which they were not marsupial. In addition, however, it was found that the visceral sex (based on the kind of gonad present) did not necessarily correlate with the morphology of the outer gills. For example, some individuals with a male visceral sex displayed marsupial gills, and still others with a female visceral sex possessed non-marsupial gills. Intergrades were discovered in all types of animals named males, females or hermaphrodites according to their visceral sex, and Bloomer concluded, in part, that sex-reversal occurs in *A. cygnea*.

There appeared no evidence of sex-reversal in the Nearctic species of *Anodonta* examined seasonally in the course of the present study. However, two types of hermaphrodites were again encountered. In *A. imbecilis*, in which both females and hermaphrodites (visceral sex criterion) may be found in the gravid state, the hermaphrodites possess marsupial outer gills. In *A. hallenbecki* and *A. peggyae* only the females were ever found gravid; the hermaphrodites have non-marsupial gills. The visceral sex of all of these hermaphrodites consistently correlates with the outer-gill morphology. In those with marsupial outer gills the ovarian and testicular tissues are both

present in considerable quantity, while in those animals with non-marsupial outer gills the mass of the testicular tissue greatly predominates.

PROGRESS IN BIOLOGICAL RESEARCH ON THE SURF CLAM, 1965

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(ABSTRACT)

The Surf Clam Program is divided into two projects: (1) population dynamics, and (2) life history studies. Research in 1965 has contributed much along both lines of work to our understanding of the surf clam, *Spisula solidissima*.

Statistical information, current and historical, about the surf clam fishery has been gathered by port sampling, interviews, trips aboard commercial surf clam boats, and from records of major processors of surf clams. The relationship between shell length and wet meat weight was determined for surf clams collected off Point Pleasant and Cape May, New Jersey. Meats of Cape May clams were slightly heavier than those of Point Pleasant clams of the same shell length. Analysis of seasonal variation in meat quality proved it to vary with spawning condition.

Surf clam gonads have been collected for several seasons from New England to North Carolina. The spawning cycle for New Jersey clams is usually biannual; clams spawn in July and again in October. Sexual products are built up over the winter and gonads ripen in late spring.

Two extended surf clam biological cruises were completed in 1965. Nearly 600 stations were sampled with a modified commercial-type hydraulic jet dredge in an area of approximately 25,000 square miles extending from Montauk Point, Long Island, to Cape Hatteras, North Carolina. Bottom composition was noted and associated invertebrates were recorded or returned to the laboratory for later identification. Surf clams were measured (greatest overall length) to determine size composition of the populations. Salinities and temperatures were taken at the surface and bottom at each station. Surf clams were most abundant in the area of the present fishery off New Jersey. They were found in lesser numbers in a narrow band off the south shore of Long Island, New York, and offshore from Delaware Bay to False Cape, Virginia.

A population of small surf clams, less than 1 year old and under 1 inch long, was found in the inlet area of Chincoteague Bay, Virginia, in late 1964. This population has been closely studied and the changes in population density and growth of the small clams determined for 1965. Densities averaged about 20 clams per square foot over a 2-mile-long section of beach. Growth was about 2 mm per month but was somewhat slower during the winter. Observed mortality was high in 1965—the surf often cast windrows of clams upon the beach and moon snails and birds fed upon other small clams.

Studies of growth and population dynamics require a fast, permanent method of marking clams. A notch, ground into the surface and edge of the

valve with an electric hand tool, proved satisfactory. More than 43,000 small clams were marked; some were planted in the open sea off Chincoteague Inlet and others were planted in the outer part of Chincoteague Bay.

RAISING OF *SEGMENTINA HEMISPHAERULA* (BENSON) FOR THE STUDY OF FASCIOLOPSIASIS¹

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Segmentina hemisphaerula was introduced from Taiwan to the laboratory at the University of Michigan in 1962 for the purpose of establishing the life cycle of *Fasciolopsis buski* (Lankester), a common intestinal parasite in the Orient. The life cycle of *F. buski* can be summarized, as follows: The eggs are passed out with the feces of the infected definitive host (man or pig). They hatch in 2 to 3 weeks in water as free swimming miracidia, which then penetrate into a suitable molluscan intermediate host. The miracidia develop in the snail host into cercariae in about 7 weeks. The cercariae are then shed into water and encyst on aquatic vegetation, such as the leaf and the fruit of the water caltrop. Man and the pig become infected by ingesting the cysts. To maintain the cycle of this parasite without interruption, it is most important to secure both infected snails and an infected pig. The pig can pass out the eggs of *F. buski* in the feces for a long time, but the snails die rather quickly. Thus, the molluscan phase of the cycle was found to be the most difficult to maintain.

S. hemisphaerula grow well in ordinary fish aquaria of various sizes. In the present study, lake water was used although tap water may be used after it has been dechlorinated. Fresh leaf lettuce can be regularly used as food. With good nutrition these snails start laying eggs when they are 30 days old and at a time when the shell diameter reaches 2.5 to 3 mm. One can expect to get 2 to 3 eggs per snail per day. The incubation period of the egg varies from 4 to 7 days at 24°C. Copulation was necessary as a stimulus to initiate normal reproduction though the snail is hermaphroditic. Unfavorable aquarium conditions can be detected by the following phenomena: (1) the snails tend to crawl out of water, (2) the presence of many empty shells, (3) limited number of young snails, (4) heavy algal growth, (5) proliferation of ostracods and (6) cloudiness of the water.

Ostracods were often present in the lake water used for rearing the snails. When present in a great number, they gave the snails a continuous mechanical irritation and caused the snails to crawl out of the water and die. They also damaged snail embryos by breaking the egg cases. It was frequently seen that the ostracods laid their eggs at the aperture of young snails, hence blocking the snails from locomotion and feeding.

Three dominant types of algae have commonly grown in the aquaria with several other minor types mixed among them. One of the three species, *Characium pringsheimii*, grew on the walls of the aquarium and was found to be favorable because the snails liked to feed on it. The second species,

¹ This investigation was supported by research grant 5 T1 AI 41-07 from the National Institute of Allergy and Infectious Diseases, U.S. Public Health Service.

Phormidium papyraceum, formed a blue-green mat on the bottom. Young snails were frequently caught beneath the mat and died. The third species, *Oocystis* sp. (aff. *lacustris*), was also unfavorable. It caused the water to appear green and greatly reduced the visibility of the water. The reproductive rate of the snails was markedly reduced for unknown reasons.

Young snails were extremely sensitive to desiccation. The resistance was considerably enhanced as the shell diameter increased, but even the largest snails could not survive for more than 25 hours of drying at 25°C with 50% air humidity.

Infection by *F. buski* caused a high mortality of the snails. As high as 60% of the exposed snails died before shedding cercariae. Among the surviving snails, as high as 40% could be positive for infection. Infected snails on the average survived for a month after the onset of cercarial emergence, and shed about 600 cercariae per snail.

SALINITY TOLERANCE AND DISTRIBUTION OF *SPISULA SOLIDISSIMA*, *MULINIA LATERALIS* AND *RANGIA CUNEATA*, FAMILY MACTRIDAE

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(ABSTRACT)

Laboratory experiments were conducted to establish the salinity tolerance limits of three mactrid clams: *Spisula solidissima* (Gmelin), *Mulinia lateralis* (Say), and *Rangia cuneata* (Gray). The three species have a unique natural distribution in western Mid-Atlantic waters. *Spisula solidissima* is usually restricted to the inlets and ocean waters above 29‰. *Mulinia lateralis* is normally found in sandy substrates and shallow water above 8‰ and becomes uncommon above 25‰. *Rangia cuneata* typically occurs in brackish water from 0 to 10‰. Despite this natural distribution the salinity tolerance of the 3 species show considerable overlap in laboratory experiments. *Spisula solidissima* survived from 10 to 30‰, *Mulinia lateralis* from 2.5 to 30‰, and *Rangia cuneata* from 0 to 30‰ (experimental salinities did not exceed 30‰). Preliminary work with larvae indicate their salinity tolerances about the same as the adult. However, activity of *M. lateralis* larvae varied with slight salinity changes well within the tolerance limits.

Since salinity limits determined experimentally do not coincide with salinity limits of natural distribution, it is suggested that distribution is primarily controlled by other factors.

SHELL REPAIR IN THE SEA SCALLOP, *PLACOPECTEN MAGELLANICUS*

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(ABSTRACT)

The sequence of repair of both the internal and peripheral shell of sea

scallops was observed during laboratory experiments as part of a study to determine mortality due to shell breakage from repeated dredging in areas of high scallop concentrations. After shells of living animals were cracked, or broken, or the edges chipped, the animals were sacrificed periodically and shell repairs or partial repairs examined. In every scallop the mantle first exuded a noncalcareous layer, a film of conchiolin, over the site of shell injury. Deposition of shell material then proceeded—first with the formation of calcium droplets over the organic substance, then with the secretion of shell material about the droplets to fill in the area. After this initial process had been accomplished, successive layering gradually thickened the shell in the repair area.

The inorganic chemical composition of the scallop shell is calcitic except for a minor percentage of aragonite secreted in the muscle-attachment areas. Repair of shell damage through the region of the insertion of the adductor muscle proceeded as described for repairs through regions of mantle tissue.

Major shell damage produced greater mantle activity that formed greater quantities of conchiolin and molded the damaged area close to the original, structurally sound, shape. When damage was major, the frequent fracture of the thin crusts of new shell material necessitated repeated repairs before the entire process was complete.

SIGNIFICANCE OF LARVAL DEVELOPMENT IN BIVALVE TAXONOMY

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(ABSTRACT)

Larval development can be of value in clarifying the taxonomic or evolutionary position of bivalves. In many families larvae have many interspecific similarities. However, larvae of the different species in some families have little in common.

Examples of families in which larvae have a similar appearance are:

Arcidae—distinctly brown, dorso-ventrally flattened, pointed reddish-brown anterior end.

Pholadidae—circular outline, globose, dark heavy appearance, pink umbo, characteristic dentition.

Teredinidae—oval, height frequently exceeds length, globose, dark with dark band around shell margin, characteristic dentition.

Anomiidae—inequivalve, left valve almost flat, characteristic knobby umbo in right valve, pale, fragile.

Examples of families in which larvae of different species vary considerably include the following:

Mactridae—at least four different hinge structures have been described, and shape is variable as evidenced by larval *Mulinia lateralis*, *Rangia cuneata* and *Spisula solidissima*.

Ostreidae—hinge structure and appearance, though similar within a

genus, vary considerable between genera. For example, larval *Ostrea* and larval *Crassostrea* are more different than larvae of the two families Pholadidae and Teredinidae.

The greater diversity in these families suggests the species involved are not as closely related as species in families where larval development is similar.

Ordinal relationships can also be clarified through studies of larval development. For example, the recent trend to place the Pandoracea in a separate subclass or order from the eulamellibranchs appears to be justified. Larval Pandoracea have a short larval period and though pelagic, do not go through straight hinge and umbo stages.

SOME IMMUNOLOGICAL RELATIONSHIPS IN THE AFRICAN GENUS *BULINUS*¹

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The African planorbid genus *Bulinus* is currently divided into three subgenera, each with a number of species. Within the subgenera, the various species are very similar morphologically, although physiologically and cytologically some of them are quite distinct. This is especially true of the species of the subgenus *Bulinus* s.s., which comprises at least two, and perhaps more, species groups. Because of the difficulty of placement of certain of the *Bulinus* s.s. species into their species groups, a placement which is of some practical importance because, of the two groups, only the *truncatus* species group is known to transmit urinary bilharziasis, we were interested in studying the immunological relationships of the various species available to us.

To date we have prepared satisfactory antibodies against foot muscle protein of the diploid *Bulinus natalensis* from Crocodile Creek, near Salisbury, Rhodesia, and an unnamed octoploid species from a stream just north of Addis Ababa, Ethiopia. [Antibody production against foot muscle proteins of the tetraploid *B. truncatus* was unsatisfactory, so we are currently repeating that part of our work.] We studied the reactions of these two antibodies with antigens prepared from foot muscle proteins of various *Bulinus* s.s. species, using Nace's (1965) modification of the Ouchterlony agar double diffusion technique. We paid special attention to those reactions indicating presence of non-homologous proteins between each of the two species we were testing.

No non-homologous protein reactions were observed with our technique when antigens of various populations ($n = 18$) of *Bulinus natalensis*, *B. tropicus*, and *B. guernei* were tested with *B. natalensis* antibodies. However, two distinct bands were formed when this antibody was tested with *B. sp.* ($n = 18$) from near Asmara, Ethiopia, *B. truncatus* ($n = 36$) of Egypt, Sudan

¹ Contribution No. 20, Intermediate Hosts of Schistosomiasis Program, Institute of Malacology. Sponsored by the Commission on Parasitic Diseases of the Armed Forces Epidemiological Board and supported by the U.S. Army Medical Research and Development Command.

² Supported by a Public Health Service research career program award (No. 5-K3-AI-19,451).

and Corsica, *B. truncatus rohlfsi* (n = 36) from Ghana and *B. coulboisi* (n = 36) from Tanzania. Also, two distinct bands representing reactions of non-homologous proteins were found when we tested these *B. natalensis* antibodies with antigens from an unnamed hexaploid species from Ethiopia and five populations of one or more unnamed octoploid species also from Ethiopia.

Strong non-homologous protein reactions were also observed when antigens of *Bulinus natalensis*, *B. tropicus*, *B. sp.* (Lake Tana; n = 18), *B. truncatus*, *B. coulboisi* and *B. sp.* (Ethiopia; n = 54) were tested with *B. sp.* (n = 72) antibodies. This may indicate that the octoploid Ethiopian species form a third species group of *Bulinus s. s.*

In general, our preliminary observations support the present intergeneric classification of the subgenus *Bulinus s.s.* based on morphology (Mandahl-Barth, 1958, 1960, 1965). However, *Bulinus guernei* and *B. natalensis* are currently placed in the *truncatus* species group (Mandahl-Barth, 1965), although they both have the chromosome number of the *tropicus* group (n = 18). These two species are immunologically similar to the *tropicus* group, indicating that the cytological characters are perhaps more reliable than the currently used morphological characters for taxonomic placement of *Bulinus s.s.* species into species groups. On the other hand, *B. sp.* (n = 18) from near Asmara exhibited a strong non-homologous antigen-antibody reaction with *B. natalensis*, indicating a distinct difference from other n = 18 species. Asmara is very far north for a member of the *tropicus* species group to occur, so perhaps our specimens represent yet another subgroup within *Bulinus s.s.* Further immunological studies should clarify this species' taxonomic position.

SOME NUDIBRANCH NAMES

HENRY D. RUSSELL

(ABSTRACT)

The compilation and consequent familiarity with the literature concerned in the formation of a world-wide bibliography of the Nudibranchia leads to several collateral interests. One of these is the multiple origins and inspirations for the literally thousands of names that find their way into such a file. Just a selected few of these are listed here; an exhaustive list would occupy many pages.

Some examples are:

Doris coccinea Forbes, 1844. The name *Doris* is from Greek Mythology. *Doris* was the mother of 50 sea nymphs, the Nereids. *Coccinea* is derived from Latin: *coccineus* meaning scarlet, and *Coccum*, the berry of the scarlet oak, *Quercus coccifera* Linn. It was thought to produce a scarlet dye, but according to Pliny, a Roman naturalist who perished in 70 A.D. while observing an eruption of Mt. Vesuvius, the dye comes from an insect.

Aeolidia coronata Forbes, 1839. The generic name originates from *Aeolis*, daughter of *Aeolus*, God of the winds. This 1½ inch British species is very cannibalistic. Individuals of equal sizes devour each other bite by bite, bristling characteristically like a porcupine at the time.

Glossodoris clenchi Russell, 1935. This species found at Ferry Reach, Bermuda, is named after Dr. W. J. Clench of the Mollusk Department in the Museum of Comparative Zoology.

Idalia elegans Leuckart, 1828. The generic name arises from Mt. Idalium on the island of Cyprus that was sacred to Venus, the goddess of love, laughter, and beauty who "stole the wits of the wise and beguiled men and gods alike."

Scyllaea grayae Adams and Reeve, 1850. The authors "dedicated this species of *Scyllaea* to Mrs. Gray, a lady to whom all who desire to study the nature of molluscos animals are highly indebted for having presented them with outlines of this class, hitherto contained in expensive and generally inaccessible works." Dr. J. E. Gray, thought that having his wife, who was ill at the time, make the drawings that appear in his Figures of Molluscos Animals (1842-1850) would be a good way for her to pass her time.

Phyllidia honloni Risbec, 1956 comes from the "beach of Honlon on black rocks" in South East Vietnam.

Doris petichialis Gould, 1852 is described from Hawaii by its author as having "over the whole surface—small regularly disposed rose-red blotches like petichiae."

Doris sumptuosa Gould, 1852. The name is self explanatory and according to its author, "this is much the largest species yet made known" (10½ inches).

THE SPECIES GROUPS OF AFRICAN *BULINUS* S.S.¹

J. B. BURCH AND R. NATARAJAN

Museum and Department of Zoology, University of Michigan

The planorbid genus *Bulinus* is found over most of the African continent where habitats are suitable for freshwater pulmonate snails. The genus is also found on the East African islands and selectively in many Mediterranean and Middle Eastern countries. The medical importance of the genus lies in the fact that certain of its species are the intermediate hosts of human urinary schistosomiasis.

The various bulinine species traditionally have been grouped into three taxa (lately referred to as subgenera, formerly as genera): *Bulinus* s.s., *Physopsis* and *Pyrgophysa*.² It is the subgenus, *Bulinus* s.s., comprising the *tropicus* and *truncatus* species groups of Mandahl-Barth (1958), that has taken most of our attention. We have been especially interested in *Bulinus* s.s., because few of the taxa that have been established within these two species groups currently can be defined with any precision in terms of the limits of morphological variation and geographical distribution. Also, the validity

¹Contribution No. 19, Intermediate Hosts of Schistosomiasis Program, Institute of Malacology. Supported (in part) by a research grant (AI 07279) from the National Institute of Allergy and Infectious Diseases, U.S. Public Health Service, and by a Public Health Service research career program award (No. 5-K3-AI-19,451) to the senior author.

²Although there are certain nomenclatorial problems associated with this system (see Mandahl-Barth, 1958, *Bull Wld Hlth Org.*, Monogr. Ser., No. 37, p 59), it is nevertheless a traditional and convenient scheme which we hesitate to abandon until more critical taxonomic work has been undertaken.

of the two groups themselves has been questioned. Yet, on both parasitological and cytological grounds, there do seem indeed to be two distinct groups, that can be defined with some precision. The more northern *truncatus* group is polyploid and as far as known, is susceptible to infection with *Schistosoma haematobium*, either under natural or experimental conditions. The more southern group is diploid and has not been found to be susceptible to human schistosome infection.

Assigning species to the two groups has proven difficult for malacologists. For example, species that were first placed with one group by Mandahl-Barth only to be shifted by him later to the other group are: *Bulinus guernei*, *B. natalensis*, and *B. sericinus*. Characters that are currently being used to assign species to one or the other of the two species groups in question are the shape of the mesocones of the first lateral teeth of the radula, the degree of presence or absence of a male copulatory organ, and the shape of the shell.

Recently, it has been reported that the *truncatus* group, previously thought not to occur south of the great African lakes, occurs as far south as South-West Africa and the Transvaal (Mandahl-Barth, 1965, *Bull. Wld Hlth Org.*, 33: 33-34). We have just had the opportunity to make chromosome number determinations for bulinid specimens from 87 localities in southern Africa. These specimens had been studied previously in regard to shells and male genitalia by D. S. Brown of the British Medical Research Council while at Durban, Natal, and in regard to radular characters by C. H. J. Schutte of the Bilharzia Research Unit, South African Council for Scientific and Industrial Research, Nelspruit, Transvaal. Our interest in this study was to see if there was a correlation between chromosome numbers and the morphological characters.

Since all *Bulinus* s.s. specimens studied from each southern African population had but 18 pairs of chromosomes (thought to be characteristic of the *tropicus* species group), while some populations had angular-sided mesocones and comprised some aphyllid specimens (characters thought to be restricted to the *truncatus* species group), these two contrasting sets of characters evidently do not always show a correlation. Therefore, either one or the other cannot be used reliably to place *Bulinus* s.s. species into one or the other of the two species groups. Whether or to what extent any of these characters are reliable is not known at present. However, we wish to reiterate that one group of species (*tropicus*) is apparently refractive to human schistosome infection, whereas, the other group (*truncatus*) can be infected. And, according to information currently available, the latter group comprises polyploid species, while those of the former group are all diploid.

SYSTEMATICS AND ZOOGEOGRAPHY OF THE CTILO CERATIDAE

DONALD R. MOORE

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(ABSTRACT)

There are two groups of minute marine gastropods in which the shell begins to uncoil while still in the larval stage, and the adult shell is a slender curved tube or is secondarily recoiled. Early workers, before the living ani-

mal was observed, placed them in the Scaphopoda, Cephalopoda, Pteropoda, and even in the Annelida. William Clark (1849) first described the living animal as a benthic gastropod, and Gray (1850) placed them in a separate family, the Caecidae.

Species described by early workers belonged to *Caecum* or to other closely related genera. Carpenter (1858) was the first to describe a genus, *Strebloceras*, which differed considerably from typical Caecidae. A similar genus, *Parastrophia*, was described by Folin (1869). One of the oddities of the Challenger Expedition was described as a new genus, *Ctiloceras*, by Watson (1886). This genus has a larval shell similar to that found in *Parastrophia*, but the teleoconch is secondarily recoiled. About a dozen recent species of these genera were named during the century after they were first discovered.

Two Australians, Tom Iredale and Charles Laseron (1957), separated the recoiled species from the Caecidae, and placed them in a new family, the Ctiloceratidae. At the same time, they erected two new subfamilies, the Pedumicrinae and the Watsoniinae. These were placed between the Caecidae and Ctiloceratidae since their systematic position was considered doubtful. The protoconch, however, and the sculpture and appearance of the teleoconch shows a close relationship between the species of the two subfamilies and the Ctiloceratidae. The Caecidae are apparently related, but should be considered a separate family. Furthermore, the species of the two subfamilies do not differ in any basic way, so Watsoniinae should be suppressed in favor of the Pedumicrinae. Iredale and Laseron were apparently misled by the poor drawings of *Watsonia* published by Folin (1880).

The family Ctiloceratidae is known only from the Eastern Hemisphere. *Parastrophia* is known from the western Atlantic of southern Europe, the Mediterranean, and in the Indo-Pacific region. The only recent species of *Strebloceras* is found around the Hawaiian Islands, and the coiled species, such as *Ctiloceras* and related genera, have only been found off the coast of Australia.

UTILIZATION OF NAIADS BY PREHISTORIC MAN IN THE OHIO VALLEY

DAVID H. STANSBERY

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(ABSTRACT)

Efforts to discover the origin and mode of distribution of the naiad species of central North America have led to the use of fossil and subfossil specimens and their associated data wherever possible. The best preserved of such specimens are products of the most recent geologic past and, of these, the finest have been preserved by the activities of prehistoric man. A preliminary survey of the naiad artifacts and midden materials in the collections of the Ohio State Museum has revealed an interesting pattern of utilization by succeeding prehistoric Indian cultures.

PALEO INDIANS (11000→6000 B.C.). These early hunters were principally flesh eaters, practiced no agriculture and any evidence of mollusk utilization has yet to be discovered.

ARCHAIC MAN (6000→1500 B.C.). These people characteristically settled near the mussel rich riffles of the larger streams of the Ohio Basin. Naiads usually formed the major part of the diet consumed by these hunters and gatherers and it is this group which is largely responsible for the extensive (up to 15 acres each) river-bank shell-middens of the Green, Cumberland, and Tennessee Rivers. The shell of *Lampsilis ovata* (Say) was occasionally modified for use as a spoon, scoop, or dipper and other species furnished the raw material for ornamental perforated discs and pendants.

ADENA PEOPLE (1500 B.C.→700 A.D.). The mastery of the fundamentals of agriculture allowed these successors of Archaic Man to range further from the rivers, develop larger communities and have more time in which to improve their artistic efforts. While the naiad became at least secondary as a source of food its shell was used not only in fashioning spoons or dippers but were further worked into small disc-shaped beads. These were made into lengthy necklaces many of which have been found preserved in burials.

HOPEWELL CULTURE (300 B.C.→600 A.D.). North American prehistoric man seems to have reached a peak of development in Hopewell. Apparently having an origin in the far west these people adopted and improved upon the finest features of the Adena people with whom they were contemporaneous. Here for the first time fresh-water pearls were collected, drilled, strung, and worn. Small pearls were occasionally set into drilled depressions in the canine teeth of the Grizzly Bear. The spoon of Hopewell was again fashioned from the capacious valves of *Lampsilis ovata* but with greater care and artistry than in any previous culture. Midden remains reveal the naiad persisting as an item of diet in the midst of a relatively well-developed agriculture.

COLE COMPLEX (800 A.D.→1200-1300 A.D.). The decline of Hopewell resulted in a general shift to more primitive cultural characteristics such as smaller communities, less agriculture, more hunting and gathering, and a great reduction in ritual and artistry. The reflection in naiad utilization is a reduction in the construction of shell ornaments and use of pearls and an increased dependence upon them as a food source. This emphasis upon utility is further demonstrated with the introduction of the shell hoe. The resulting culture, termed the Cole Complex, was gradually absorbed by the influx of Fort Ancient people from the south and the Erie invasions from the north.

FORT ANCIENT-ERIE (1200-1300 A.D.→circa 1650 A.D.). From Adena until late Cole (early Fort Ancient-Erie time) either crushed granitic rock, crushed limestone, or sand was used as a tempering agent in pottery construction. At this time, however, shell tempering was introduced and within less than a century crushed naiad shell became the universal tempering agent of Indian pottery. These cultures also depended heavily upon naiads as food and the disk-shaped and pendant type ornaments which they worked from mussel shell are very similar to those recovered from Archaic sites. Here also are found for the first time shell scrapers, and strippers along with shell hoes.

The Fort Ancient-Erie Culture came to an end with the invasions of the conquering Iroquois from the north in the early 1600's. The Pre-history of the North American Indians of the Ohio Valley ends about this same time with the early explorations of the Jesuits.

Thus it can be seen that the rich prehistoric naiad fauna of North America provided the prehistoric American Indian with 1) a major source of food, 2) functional utensils and 3) attractive ornaments from at least 6000 B.C. well down into the time of recorded history.

ZOOGEOGRAPHY OF MOLLUSCA OF WESTERN MONTANA

ROYAL BRUCE BRUNSON
University of Montana

(ABSTRACT)

Distributional records of mollusks found in Western Montana were given. Seven species of mollusks have been introduced by man. *Haplotrema* occurs in remnants of the coastal forest. One freshwater limpet, two slugs, and two snails are endemic to the Northwest region (three of these constitute new records for Montana). Those land snails which are endemic to Western Montana are *Oreohelix elrodi*, *O. alpina*, *O. amaradix*, *O. carinifera*, and *Discus brunsoni*. Colored slides showing type localities and habitats were shown.

ZOOGEOGRAPHY OF THE FAMILY AMBLEMIDAE¹

J. P. E. MORRISON
U.S. National Museum, Washington, D.C.

Rafinesque named this family in 1820, as separate from the Unionidae, as I put on record in the AMU reports for 1955 (p. 16). Freshwater mussels or Naiads belonging to the Family Amblesmidae possess glochidia larvae whose shells are oval in shape, with a short hinge line. The most highly developed genera, the North American Subfamily Lampsilinae, with animals and shells that are all sexually dimorphic, are not further considered here. They form a most interesting subject of their own.

Anatomically proven members of the typical Subfamily Amblesminae are now known from Africa, southern Europe, the Middle East, India, and Malaysia to China, as well as from both Pacific and Atlantic river drainages of North America. In other words, the Subfamily Amblesminae is primarily Holarctic in geographic distribution.

In the following geographic arrangement of generic names, the type species of each genus is listed.

EASTERN NORTH AMERICA

(Atlantic River Drainages)

AMBLEMA Rafinesque 1819 (*ovalis* Rafinesque 1819)
= *rariplacata* Lamarck 1819.

MEGALONAIAS Utterback 1915 (*heros* Say 1829)
= *gigantea* Barnes 1823.

PLECTOMERUS Conrad 1853 *dombeyanus* Valenciennes 1827.

¹Published by permission of the Secretary of the Smithsonian Institution.

QUINCUNCINNA Ortmann 1922 *burkei* Walker 1922.
 ELLIPTOIDEUS Frierson 1927 *sloatianus* Lea 1840.
 PSORONAIAS Crosse & Fischer 1894 *psoricus* Morelet 1851.
 BARYNAIAS Crosse & Fischer 1894 *pigerrimus* Crosse & Fischer 1894.
 ORTHONYMUS Agassiz 1852 *cylindricus* Say 1817.
 THELIDERMA Swainson 1840 *metanevra* Rafinesque 1820.
 QUADRULA Rafinesque 1820 *quadrula* Rafinesque 1820.
 TRITIGONIA Agassiz 1852 *verrucosa* Rafinesque 1820.
 PUSTULOSA Frierson 1927 *bullata* Rafinesque 1820.
 CYCLONAIAS Pilsbry 1922 *tuberculata* Rafinesque 1820.
 PLETHOBASUS Simpson 1900 *cyphus* Rafinesque 1820.
 LUTEACARNEA Frierson 1927 *striata* Rafinesque 1820.
 FUSCONAIA Simpson 1900 *undata* Barnes 1823.
 PLEUROBEMA Rafinesque 1819 *clava* Lamarck 1819.
 SINTOXIA Rafinesque 1820 *sintoxia* Rafinesque 1820.
 LEXINGTONIA Ortmann 1914 *subplanus* Conrad 1834.
 ELLIPTIO Rafinesque 1819 *crassidens* Lamarck 1819.
 CUNICULA Swainson 1840 (*purpurascens* Lamarck 1819)
 = *complanatus* Lightfoot 1786.
 EURYNIA Rafinesque 1819 *dilatata* Rafinesque 1820.
 CANTHYRIA Swainson 1840 *spinosus* Lea 1836.
 UNIOMERUS Conrad 1853 *tetralasmus* Say 1830.
 HEMISTENA Rafinesque 1820 *lata* Rafinesque 1820.

WESTERN NORTH AMERICA

(Pacific River Drainages)

GONIDEA Conrad 1867 *angulata* Lea 1838.

In contrast to the very heavy, thick shells from North America, many of the African shells of this group are small and thin, and may complete a generation in two, or even in one calendar year. Their life span is apparently very short.

AFRICA

NITIA Pallary 1924 *teretiuscula* Phillipi 1847.
 CAELATURA Conrad 1853 *aegypticus* Cailliaud 1826.
 RENEUS Jousseau 1886 *reneus* Jousseau 1886.
 ZAIRIELLA Haas 1962 *cridlandi* Mandahl-Barth 1954.
 ZAIRIA Rochebrune 1886 *elegans* Rochebrune 1886.
 PHARAONIA Rochebrune 1886 *bourguignati* Rochebrune 1886.
 MESAFA Haas 1936 *mesafricana* Pilsbry & Bequaert 1927.
 LAEVIROSTRIS Simpson 1900 *stagnorum* Dautzenberg 1890.
 KISTINAIA Haas 1936 *schoutedeni* Haas 1936.
 AFROPARREYSIA Haas 1936 *lobensis* Frierson 1913.
 KALLIPHENGA Haas 1936 *ruellani* Bourguignat 1883.
 RHYTIDONAIA Haas 1936 *graueri* Haas 1927.
 MWERUELLA Haas 1936 *mweruensis* E. A. Smith 1908.
 BRAZZAEA Bourguignat 1885 *anceyi* Bourguignat 1885.
 GRANDIDIERIA Bourguignat 1885 *burtoni* Woodward 1859.
 NYASSUNIO Haas 1936 *nyassensis* Lea 1864.
 AFRONAIA Haas 1962 *framesi* Connolly 1925.

SOUTHERN EUROPE AND THE MIDDLE EAST

POTOMIDA Swainson 1840 (*corrugata* Swainson 1840)
= *semirugatus* Lamarck 1819.

The species *P. littoralis* Cuvier 1798 from Spain; *P. incurvus* Lea 1831 from North Africa; and *P. semirugatus* Lamarck 1819 from Mesopotamia, represent the Ambleminae in this region. *Potomida* has as synonyms the following: *Psilunio* Stefanescu 1896, *Rhombunio* Germain 1911, and *Migranaja* Hannibal 1912.

ASIA

PARREYSIA Conrad 1853 (*multidentatus* Phillipi 1847)
= *corrugata* Müller 1774.
HEMISOLASMA Rafinesque 1831 *vitrea* Rafinesque 1831.
INDONAIA Prashad 1918 *striata* Rafinesque 1831.
DIPLASMA Rafinesque 1831 (*marginata* Rafinesque 1831)
= *testudinaria* Spengler 1793.

RADIATULA Simpson 1900 *crispisulcatus* Benson 1862.
RECTIDENS Simpson 1900 *prolongatus* Drouet 1894.
CONTRADENS Haas 1912 *contradens* Lea 1838.
PHYSUNIO Simpson 1900 *gravidus* Lea 1856.
PSEUDODON Gould 1844 *inoscularis* Gould 1844.
MONODONTINA Conrad 1853 *vondembuschiana* Lea 1840.
TRIGONODON Conrad 1865 *crebristriata* Anthony 1865.
OBOVALIS Simpson 1900 *loomisi* Simpson 1900.
PROTUNIO Haas 1912 *messengeri* Bavay & Dautzenberg 1901.
HYRIOPSIS Conrad 1853 (*delphinus* Gruner 1841)
= *bialatus* Simpson 1900.

LIMNOSCAPHA Lindholm 1932 *myersiana* Lea 1856.
CHAMBERLAINIA Simpson 1900 *hainesiana* Lea 1856.
SIMPSONIA Rochebrune 1904 *duclerci* Rochebrune 1882.
LAMPROTULA Simpson 1900 *nodulosa* Wood 1815.

The *Hyriopsis-Lamprotula* complex from China and Southeast Asia includes some of the heaviest, thickest, most nodulose and tuberculate of all the Amblemidæ.

CUNEOPSIS Simpson 1900 *celtiformis* Heude 1874.
ACUTICOSTA Simpson 1900 *chinensis* Lea 1868.
SCHISTODESMUS Simpson 1900 *lampreyanus* Baird & Adams 1867.

The following elongate (burrowing) mussels also belong here.
BALWANTIA Prashad 1919 (*soleniformis* Benson 1836)
= *bensoni* Lea 1870.

BINEURUS Simpson 1900 *mouhoti* Lea 1863.
TRAPEZOIDEUS Simpson 1900 *foliacea* Gould 1843.

Bineurus and *Trapezoideus* from Southeast Asia are very closely related to the Western American genus *Gonidea*, as far as known. In addition, there is an undescribed genus of typical Ambleminae shells from Thailand that are anchored in clay and/or gravel in the adult stage. They are apparently parallel in ecology to the Mutelid freshwater mussel *Bartlettia* of South America.

AMERICAN MALACOLOGICAL UNION

TREASURER'S ANNUAL REPORT FOR 1965

Balance on hand January 1, 1965:

Life Membership Fund	\$ 970.88		
Savings Account balance	2,223.51		
Checking Account balance	223.49		
Cash & stamps, Sec'y.	54.45		
Cash & stamps, Treas.	57.07	\$3,529.40	

Income:

Life Membership	60.00		
Membership dues collected	2,007.50		
Pacific Division assessments collected	71.50		
Dues paid in advance; credits	28.00		
Overpayments on dues	21.00		
Donation	1.00		
Sales, back issues Annual Report	6.00		
Sales, How To Collect Shells, 2nd ed.	191.70		
Sale of metal type, HTCS, 2nd edition	156.80		
Advertising for HTCS, 3rd edition	36.00		
Final payment on loan to Pac. Division	25.00		
Miscellaneous bank credits	3.50		
Interest on savings account	166.59	\$2,774.59	\$6,303.99

Expenses:

Printing & mailing Annual Report	1,257.14		
Miscellaneous printing, mimeo & copy	294.71		
Postage & express	191.33		
Pacific Div. assessments forwarded	71.50		
Refund of overpayments on dues	21.00		
Telephone, telegraph & notary charges	6.45		
Miscellaneous office supplies	20.31		
Miscellaneous bank charges	8.58		
Secretary's expenses to Staten Island	224.30		
Convention expenses, Staten Island	43.05		
Pac. Div. Secretary's expenses, San Diego ..	10.85		
Advance to new A. M. U. Treasurer	150.00	\$2,299.22	\$4,004.77

Balance on hand December 31, 1965:

Life Membership Fund	1,030.88		
Savings Account	2,740.10		
Checking Account	173.45		
Cash & stamps, Secretary	48.22		
Cash & stamps, Treasurer	12.12	\$4,004.77	\$4,004.77

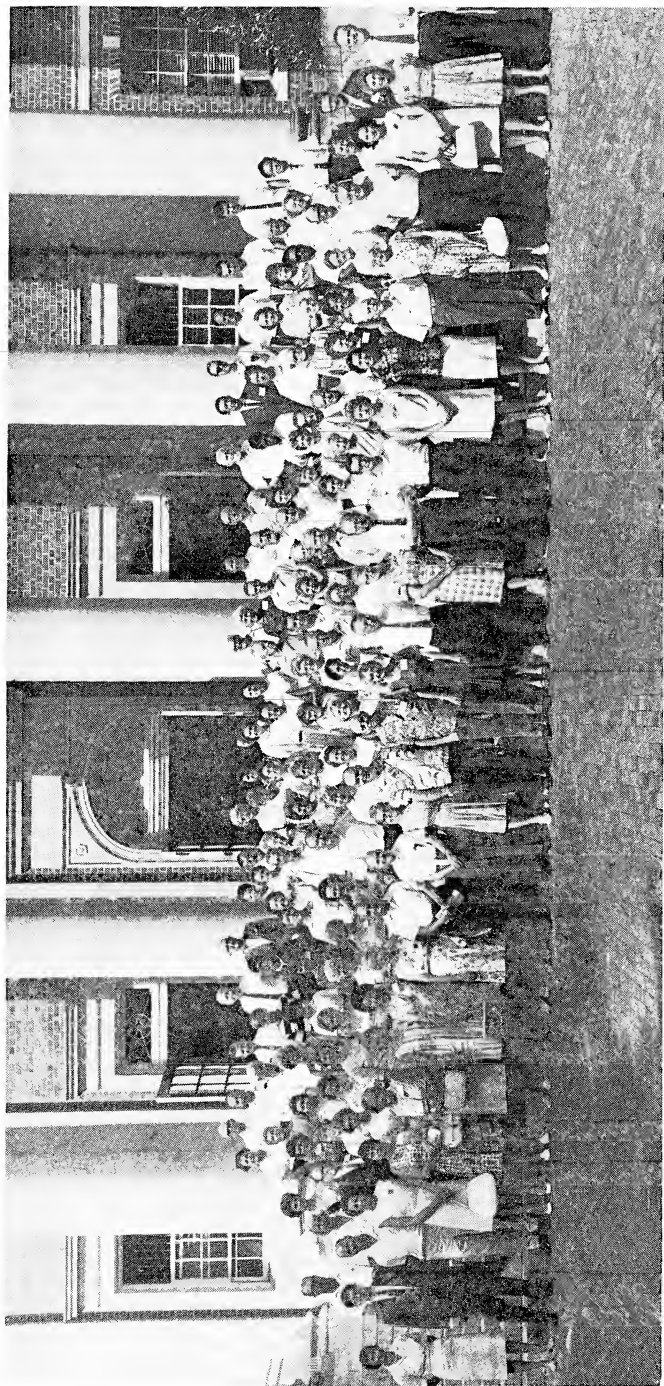
Respectfully submitted,

Jean M. Cate, Treasurer
 AMERICAN MALACOLOGICAL
 UNION
 December 31, 1965

Approved by the Auditing Committee:
 Myra Keen, Chairman
 Edwin C. Allison
 Crawford N. Cate

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Dr. and Mrs. Horace B. Baker, "Nautilus," Philadelphia
Mrs. Dorothy Beetle, Charlotte Children's Nature Museum, Charlotte, North Carolina
Dr. and Mrs. M. H. Bertling, Greensboro, North Carolina
Dr. Kenneth Jay Boss, Museum of Comparative Zoology, Cambridge, Massachusetts
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Dr. Royal Bruce Brunson, University of Montana, Missoula, Montana
Michael Castagna, Virginia Institute of Marine Science, Gloucester Point, Virginia
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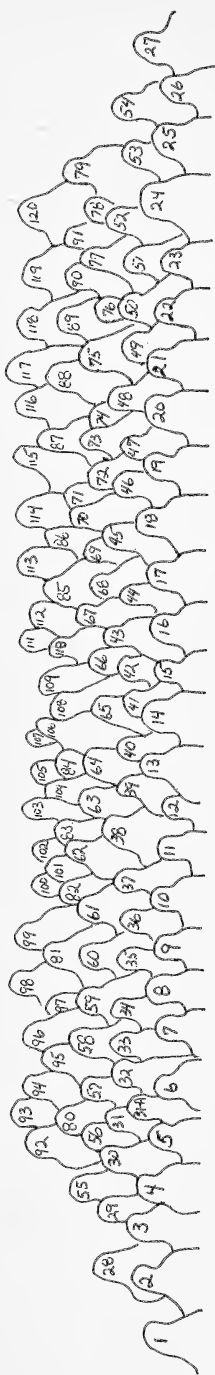
AMERICAN MALACOLOGICAL UNION

at

University of North Carolina

32nd annual meeting

August 22-27, 1966



1. Germaine Warmke, 2. Dr. Kenneth Boss, 3. Dr. Donald R. Moore, 4. Charlotte Johnson (Chapel Hill), 5. Grace Louise Rickard, 6. Kate Charles, 7. Elizabeth N. McKinly, 8. Ruth S. Dixon, 9. Bess Withrow, 10. Morris K. Jacobson, 11. Juan J. Parodiz, 12. Esther Parodiz, 13. Dr. J. P. E. Morrison, 14. Dr. William J. Clench, 15. Mrs. Ralph Dexter, 16. Dr. Ralph W. Dexter, 17. Margaret C. Teskey, 18. Dr. Arthur H. Clarke, 19. Dr. R. Tucker Abbott, 20. Mrs. R. Tucker Abbott, 21. Ann Young, 22. John B. Proetz, 23. Mrs. John B. Proetz, 24. Carl Withrow, 25. Charlotte Johnson (Raleigh), 26. Lallah Wadsworth, 27. Jim Wadsworth, 28. Dr. Arthur Merrill, 29. Mrs. Arthur Merrill, 30. Dr. Charles E. Jenner, 31. Marguerite Thomas, 31A. Olive Lewis, 32. Cornelia McInnes, 33. Ann Yelvington, 34. Lula Siekman, 35. Jennette H. Emgarth, 36. Adaline C. Westerfield, 37. Gladys McCallum, 38. John McCallum, 39. Harriette L. Hickman, 40. Freda S. Knauer, 41. Miriam K. Hicks, 42. Dorothy E. Beattie, 43. William R. Reader, 44. Esther F. Reader, 45. Flynn Ford, 46. Mary Ford, 47. Mrs. Ward Brown, 48. John Root, 49. Mrs. Lucille Wightman, 50. Mrs. Rose Mack, 51. Mrs. M. H. Bertling, 52. Paul Jenne-
wein, 53. Mrs. Kay Lawrence, 54. Hugh J. Porter, 55. Mrs. Arthur H. Clarke, 56. Mrs. David Stansbery, 57. Irene Starrett, 58. Mary Waetherburn, 59. Sharon Snyder, 60. Dr. Dee Dundee, 61. Dr. Harold Dundee, 62. Harry Snyder, 63. June Snyder, 64. Terry Marsh, 65. Corinne E. Edwards, 66. Mrs. H. B. Baker, 67. Albert Taxson, 68. Mrs. Albert Taxson, 69. Mrs. Henry Wehringer, 70. Dr. Henry Wehringer, 71. Elizabeth Eubanks, 72. Mrs. Smith Whiteside, 73. Mrs. Adlai B. Wheel, 74. Adlai B. Wheel, 75. Rev. H. B. Herrington, 76. Mrs. H. B. Herrington, 77. Rajah Natarajan, 78. Mrs. Maude Roberson, 79. Chint-sung Lo, 80. Ruth A. Craine, 81. Douglas McCal-
lum, 82. Mrs. T. W. Yarbrough, 83. Dorma Coley, 84. Dorothy Raehle, 85. Dr. Harold Murray, 86. Lou Mason, 87. Richard R. Graus, 88. Carl S. Wood, 89. Mrs. Carl S. Wood, 90. Grace R. McBride, 91. Gene Coley, 92. Mrs. Ben Lencher, 93. Judge Ben Lencher, 94. Dr. Royal Bruce Brunson, 95. Howard Root, 96. Dr. David H. Stansbery, 97. Arthur Clarke, Jr., 98. William C. Starrett, 99. M. H. Bertling, 100. Mrs. Paul Jennewein, 101. Juliette Compitello, 102. Edward D. McGowen, 103. Marilu C. Horton, 104. Mathilde Weingartner, 105. Charlotte Ann McGraw, 106. Marian Schorth, 107. Mrs. Raymond Strickland, 108. Dr. Dorothea Franzen, 109. Lee Woodward, 110. Dr. H. B. Baker, 111. LeRoy Heist, 112. Mattie Heist, 113. Bill Shaw, 114. George D. Robinson, 115. N. Gordon Ustick, 116. Richard E. Petit, 117. Dr. William Heard, 118. Dr. Emile A. Malek, 119. Richard H. Russell, 120. Gene K. Lindsay.

Mr. and Mrs. Paul Jennewein, Wrightsville Beach, North Carolina
 Mrs. Kenneth Johnson, Raleigh, North Carolina
 Mrs. Freda Knauer, Cockeysville, Maryland
 Mrs. Kay Lawrence, Falmouth, Massachusetts
 Judge and Mrs. Benjamin Lencher, Pittsburgh, Pennsylvania
 Mrs. J. Kenneth Lewis, College Park, Maryland
 Mr. and Mrs. Gene Lindsay, University of Michigan, Ann Arbor, Michigan
 Chin-Tsong Lo, University of Michigan, Ann Arbor, Michigan
 Mr. and Mrs. Walter G. Lowry, Raleigh, North Carolina
 Mrs. Grace R. MacBride, North Wales, Pennsylvania
 Dr. Emile Malek, Tulane University, New Orleans, Louisiana
 Mr. and Mrs. John McCallum and Douglas, Wexford, Pennsylvania
 Mrs. Charlotte Ann McCraw, N.C. Department Water Resources, Raleigh,
 North Carolina
 Edward McGowen, Turkey, North Carolina
 Mrs. R. C. McInnes, Raleigh, North Carolina
 Mrs. Elizabeth McKinley, Washington, D.C.
 Mrs. Terry Marsh, Ft. Lauderdale, Florida
 Lou Mason, Naples, Florida
 Dr. and Mrs. Arthur S. Merrill, Bureau of Commercial Fisheries, Oxford,
 Maryland
 Dr. and Mrs. Donald R. Moore, University of Miami, Miami, Florida
 Dr. and Mrs. J. P. E. Morrison, U.S. National Museum, Washington, D.C.
 Dr. Harold D. Murray, Trinity University, San Antonio, Texas
 Dr. Rajagapola Natarajan, University of Michigan, Ann Arbor, Michigan
 Dr. H. T. Odum, University of North Carolina, Chapel Hill, North Carolina
 Dr. and Mrs. Juan J. Parodiz, Carnegie Museum, Pittsburgh, Pennsylvania
 Richard E. Petit, Ocean Drive Beach, South Carolina
 Mr. and Mrs. Emmitt Piper, Gloucester, North Carolina
 Mr. and Mrs. Hugh J. Porter, Institute of Fisheries Research, Morehead City,
 North Carolina
 Mr. and Mrs. John B. Proetz, Boynton Beach, Florida
 Mrs. Dorothy Raeihle, Elmhurst, New York
 Mr. and Mrs. William R. Reader, St. Petersburg, Florida
 Mrs. George C. Rickard, Silver Spring, Maryland
 Major and Mrs. George D. Robinson, St. Petersburg, Florida
 John and Howard Root, West Palm Beach, Florida
 Richard H. Russell, University of Montana, Missoula, Montana
 Miss Marian Schroth, Woodhaven, New York
 Bill Shaw, Bureau of Commercial Fisheries, Oxford, Maryland
 Mrs. Lulu B. Sickman, St. Petersburg, Florida
 Mr. and Mrs. Harry P. Snyder, McKeesport, Pennsylvania
 Dr. and Mrs. David H. Stansbery, Ohio State Museum, Columbus, Ohio
 Dr. and Mrs. William C. Starrett, Illinois Natural History Survey, Urbana,
 Illinois
 Mrs. Raymond Strickland, Louisburg, North Carolina
 Mr. and Mrs. Albert Taxson, Bronx, New York
 Mrs. Margaret C. Teskey, Marinette, Wisconsin
 Miss Marguerite Thomas, Swansboro, North Carolina

Dr. Jack Upchurch, Raleigh, North Carolina
Gordon Nowell-Usticke, St. Croix, U.S. Virgin Islands
Mr. and Mrs. James E. Wadsworth, Chapel Hill, North Carolina
Dr. and Mrs. Frank Warder, Anderson, South Carolina
Mrs. Allan Warehime, Hanover, Pennsylvania
Mrs. Germaine Warmke, Gainesville, Florida
Miss Maryl Weatherburn, Ottawa, Ontario, Canada
Dr. and Mrs. Henry Wehringer, Chicago, Illinois
Miss Mathilde Weingartner, Staten Island Museum, Staten Island, New York
Mrs. Adaline C. Westerfield and Miss Annette Emgarth, Haverford, Pennsylvania
Capt. and Mrs. Adlai B. Wheel, Syracuse Boys' Club, Syracuse, New York
Mrs. Jeanne Whiteside, Durham, North Carolina
Mrs. Lucille Wightman and Mrs. Rose Mack, Westbrook, Ontario, Canada
Mr. and Mrs. Carl C. Withrow, Charlotte, North Carolina
Mr. and Mrs. Carl Wood, High Point, North Carolina
Miss Lee Woodward, Wilmington, North Carolina
Robert M. Yancey, Bureau of Commercial Fisheries, Oxford, Maryland
Miss Ann Yelvington, Clayton, North Carolina
Mrs. Ann Young, Chicago, Illinois

THE AMERICAN MALACOLOGICAL UNION EXECUTIVE COUNCIL 1966-1967

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Emile A. Malek	Robert Robertson

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Harald A. Rehder (1941)	R. Tucker Abbott (1959)
Henry van der Schalie (1946-47)	Katherine V. W. Palmer (1960)
Myra Keen (1948)	Thomas E. Pulley (1961)
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Fritz Haas (1950)	Albert R. Mead (1963)
J. P. E. Morrison (1951)	John Q. Burch (1964)
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Morris K. Jacobson (1955)	

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 Vice-Chairman DWIGHT W. TAYLOR
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 Executive Board A. MYRA KEEN, EDWIN C. ALLISON, ALAN J. KOHN

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H. B. Baker	Katherine V. W. Palmer
William J. Clench	Fritz Haas
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★ HONORARY LIFE PRESIDENT S. Stillman Berry

THE AMERICAN MALACOLOGICAL UNION, INC.
PACIFIC DIVISION
NINETEENTH ANNUAL MEETING

SUMMARY OF CONVENTION

The nineteenth annual meeting of the Pacific Division of the American Malacological Union was held at the University of Washington, Seattle, Washington, June 19-22, 1966. Hosts were the Pacific Northwest Shell Club and the University of Washington Department of Zoology.

Although registration did not officially start until the next day, the field trip was held on a beautiful Sunday, June 19, under the leadership of William J. Rice of the local club. About 60 enthusiastic collectors took the ferry from Seattle across Puget Sound and collected north and south of the ferry dock at Southworth. Some of the shells taken were *Polinices lewisii*, *Thais lamellosa*, *Thais emarginata*, many chitons, including *Mopalia muscosa* and *Mopalia lignosa*, and a number of *Acmaea* and *Littorina*.

Registration started at 9:00 a.m., Monday, June 20, at the Student Union Building under the direction of Elsie Marshall, secretary, and Col. Harvey Johnson, treasurer, assisted by Salle Crittenden, Ann Smiley, Rita Cunningham, and Peggy Shearer. Coffee was served throughout the morning in the South Lounge, site of many interesting and informative exhibits and an informal gathering place throughout the convention.

At 1:30 p.m. Chairman Alan J. Kohn opened the meeting in the auditorium of the Student Union Building, welcomed everyone to Seattle, and read telegrams expressing wishes for a successful meeting from AMU secretary Margaret Teskey and Senator Warren G. Magnuson of Washington. Four papers on the biology of opisthobranchs comprising the first session were then presented: "Nudibranchs in color," by Allyn G. Smith (See page 75); "The egg masses and veligers of opisthobranchs," by Anne Hurst (See page 64); "Food preference and feeding behavior of four nudibranchs," by Virginia Waters (See page 63); and "Studies on the structure and function of the buccal mass of two gymnosomatous pteropods," by Carol M. Lalli (See page 75).

Following the afternoon session, there was a tour of the U. S. Bureau of Commercial Fisheries research facilities adjacent to the University campus arranged by Dr. John Glude, former shellfish biologist and now Deputy Regional Director of the Bureau. A dinner meeting of the Executive Board was held at 6:00 p.m.

Monday evening the Pacific Northwest Shell Club welcomed members and guests with a "Potlatch" in the Dining Hall of McMahon Hall, the University's newest dormitory, where out-of-town registrants were housed. The tables were laden with food, smoked oysters, salmon, cake, punch, etc. Since "Potlatch" means give-away, boxes of Pacific Northwest shells were given away by the local club to everyone, and a free raffle gave away many shells, catalogues and craft objects to almost everyone present. These included collections of East Coast shells and fossil shells from Virginia and Florida, donated by William Old, Jr., of the American Museum of Natural History in New York City.

Tuesday's sessions were held all day at the Student Union Building, the morning session starting at 9:00 a.m. and the afternoon session at 1:30 p.m., with breaks for coffee midway through each session. The morning session included seven papers on the ecology and biochemistry of gastropods and the physiology of cephalopods: "Growth, predation, and distribution in *Tegula funebris*," by Robert T. Paine; "Why are there so many species of *Conus*?" by Alan J. Kohn (See page 72); "Qualitative analysis of the uric acid, xanthine, and guanine content of several snails," by Frederick Duerr (See page 69); "Total lipids in eight species of snails," by William B. Stickle, Jr., and David N. Emerson (See page 76); "Control of blood sugar in the octopus," by C. Keith Goddard (See page 65); and "The spermatophoric reaction in *Octopus dofleini*," by A. W. Martin.

The Tuesday afternoon session featured general and taxonomic papers and a timely review of conservation of molluscan habitats: "Preservation of marine resources," by Ronald Westley; "The geoduck," by Cedric E. Lindsay; (See page 67); "Some notes on the molluscan collections at the University of Copenhagen," by Myra Keen (See page 73); "The story of the west American Marginellidae," by Eugene V. Coan and Barry Roth (See page 73); and "Chitons in color," by Allyn G. Smith (See page 65). Following the Tuesday afternoon session, the annual business meeting was held.

MINUTES OF THE BUSINESS MEETING AMU-PD

June 21, 1966

The annual Business Meeting of the American Malacological Union-Pacific Division was called to order by the chairman, Dr. Alan J. Kohn, at 4:30 p.m., June 21, 1966.

It was moved, seconded, and passed unanimously that the minutes of the 1965 Business Meeting at San Diego be accepted as printed in the AMU Annual Report.

The treasurer's report was given, indicating a current balance of \$988.76. The report as given was accepted.

Dr. Rudolf Stohler explained the work that has been done by the Bylaws Revision Committee, including changes found to be necessary since the revised bylaws were mailed to AMU-PD registrants. Adoption of the new bylaws was moved, seconded, and after discussion on some points, was unanimously carried.

Dr. Stohler discussed the budget of the Bylaws Revision Committee. A motion was made to allot another \$60.00 for the committee. This was amended to \$75.00. The amendment was accepted by the original person to make the motion, seconded and passed unanimously.

The following were appointed by Chairman Kohn:

Nominating Committee: Myra Keen, Chairman; Rudolf Stohler, Crawford N. Cate. Auditing Committee: Jean M. Cate, Chairman; Allyn G. Smith, Rudolf Stohler. Mentor-Parliamentarian: Rudolf Stohler.

Dr. Myra Keen, Chairman of the Nominating Committee, explained the necessity of Dr. Victor Loosanoff to decline the chairmanship. She presented the following slate: Chairman, Gale Sphon; 1st Vice-Chairman, Dwight Taylor; Secretary, Virginia Hanselman; Assistant Secretary, Col. George Hanselman; Treasurer, Helen DuShane; 2nd Vice-Chairman, Dr. Bruce Campbell

(pending his acceptance and approval of the new bylaws by the National AMU Meeting). There were no further nominations from the floor and the new slate of officers was voted in by a unanimous ballot.

Dr. Stohler reminded members that the AMU is now tax-exempt, and as a tax-exempt organization, the AMU cannot support any legislation.

The secretary was instructed to write a letter to thank the Pacific Northwest Shell Club for their hospitality and hard work in putting on such a successful Annual Meeting. This was to be read at the banquet Tuesday night and a copy sent to the club.

A motion was made and seconded and passed unanimously that the Nominating Committee be reimbursed for phone calls.

Since there was no further business, the meeting was adjourned.

Respectfully submitted,

Elsie Marshall, Secretary, AMU-PD

The banquet was held Tuesday evening at 7:00 p.m. at the Windjammer Restaurant at Shilshole Marina, where the pleasure boats coming and going, the delicious dinner and the friendly atmosphere made a very enjoyable evening. Agnes Ward and her committee prepared the table decorations, including the lovely corsages for all of the women.

After dinner Chairman Kohn introduced members and guests at the head table. Members of the Pacific Northwest Shell Club who were Committee chairmen for the AMU-PD meeting were introduced and appreciation expressed for their efforts. The secretary of the AMU-PD read a letter from the membership thanking the Pacific Northwest Shell Club for all their work and hospitality. Mrs. Phyllis Eliason and her daughter, Nancy, of Agana, Guam, were introduced as the members who had come the farthest for the meeting.

A highlight of the banquet was the presentation of the AMU-PD Award of Honor to Professor Trevor Kincaid, the oldest living member of the Pacific Northwest Shell Club and a member of the faculty of the Department of Zoology of the University of Washington for the past 65 years. Born in Peterboro, Ontario, Canada, in 1872, Professor Kincaid entered the University as a freshman in 1894, became a teaching assistant in zoology in 1895, and graduated in 1899. From 1901 to 1947 he was Professor of Zoology, and he has been Emeritus Professor of Zoology since then. The development of the marine sciences at the University of Washington is due largely to his foresight; he was instrumental in establishing the Department of Oceanography, the College of Fisheries, and the Puget Sound Biological Station, now the Friday Harbor Laboratories.

Professor Kincaid's contributions to conchology and malacology have been both direct and indirect. He pioneered in the introduction of the Japanese oyster, *Crassostrea gigas*, into Washington, an introduction which has grown into a multi-million dollar industry. His publications on mollusks have come during the latter part of his long career. He has published studies of the variation of the shells of *Thais lamellosa* and *Thais lima*, and at the age of 91, published a paper on the parasitic gastropod, *Enteroxenos oestergreni*, in the Transactions of the American Microscopical Society. Professor Kincaid's

zoology courses are remembered with respect by many generations of University of Washington students, including the present AMU-PD vice-chairman, Professor V. L. Loosanoff, and many other AMU-PD members. At the presentation ceremony at the AMU-PD banquet, a dozen former students of Professor Kincaid stood in tribute to their teacher and deserved recipient of the Award of Honor.

The principal address at the banquet was given by Dr. Victor L. Loosanoff, whose pioneering investigations into many aspects of the biology of economically important bivalves and associated organisms have led to knowledgeable, ecologically sound utilization and protection of important marine resources. (See page 72.) An alumnus of the University of Washington and student of Professor Trevor Kincaid, Dr. Loosanoff received his Ph.D. at Yale University and directed the U. S. Bureau of Commercial Fisheries Biological Laboratory at Milford, Connecticut, for many years before "retiring" to his present professorship in marine biology at the Pacific Marine Station of the University of the Pacific. His lucid talk ranged widely over the types of information required in marine biological studies, the techniques employed in answering the questions posed, and the effective use of the results of basic research for the betterment of mankind. All present enjoyed and profited from a richly illustrated description of the diverse activities of a marine biological laboratory.

Wednesday's activities were held at Seattle's unique Pacific Science Center, through the cooperation of its director, Dr. Dixy Lee Ray. Registrants were invited to tour the Science Center exhibits and programs during the morning, then a no-host luncheon was served in the restaurant at the top of the nearby Space Needle overlooking the city and the Puget Sound region. The afternoon papers, featuring mollusks of various regions, were then presented in the Eames Theater of the Pacific Science Center: "Land snails of the Galápagos Islands—Distribution and possible evolution," by Allyn G. Smith (See page 68) ; "Dredging in Gulf of Mexico," by William E. Old, Jr.; "Comments and illustrations, Prince William Sound," by Robert R. Talmadge (See page 65) ; "Alaska earthquake investigations, 1965," by Walter J. Eyerdam (See page 66).

Wednesday evening's session, also in the Eames Theater, featured "Glimpses of the Galápagos" by Allyn G. Smith (See page 69), followed by informal slides by Crawford Cate and William Old, Jr. Crawford Cate's slides included some of live golden cowries in an aquarium. William Old's slides were of some of the rare species in the American Museum of Natural History. Coffee and refreshments were served after the final slides and good-byes were said until next year.

The Accommodations Committee was headed by Effie Forthun, who made sure all were comfortable in their rooms. At each door she placed a beautiful fresh-water clam, *Margaritifera margaritifera* from a Washington river. The Printing Committee Chairman was Gerald Ward, ably assisted by his wife, Agnes. Ralph Jones handled the publicity, assisted by Gerald Ward. Thomas Rice and Agnes Ward coordinated their efforts to make the reception the success that it was. The refreshments for each coffee break and for Wednesday evening were arranged by Helen Mahood, with many of the members of the local club helping her. The Transportation Committee was

headed by Maurice Patten, who saw to it that everyone had rides to the Field Trip, the Fisheries Research Laboratory, the banquet, and the Pacific Science Center. Gerald Ward coordinated the overall efforts of the Pacific Northwest Shell Club, and assisted by his wife, Agnes, helped on almost every committee.

The Co-Chairman for the exhibits were Thomas Rice and "Cookie" Wingard. The following exhibits were on view the entire period of the Annual Meeting in the South Lounge in the Student Union Building: Everett Stiles, Deep water North Pacific shells; Ann Smiley, *Xenophora* of the world; Gerald Ward, Puget Sound shells; Emmeline Wingard, Chitons from Washington; William Old, Jr., East Coast shells and fossil shells from Virginia and Florida; Dorothy Jarosek, Stamps with shells; Cedric Lindsay, Live Geoducks; John Saxby, Fossilized shark's teeth; Elsie Marshall, Galápagos marine shells, Galápagos land snails; Alan J. Kohn, Venomous *Conus*; Walter Eyerdam, Deep water shells from the North Pacific, and Land and tree snails of the world; Thomas Rice, Variations of *Thais lamellosa*, Color variations in scallops from Mexico, Puget Sound shells, Shell books from the world, Shells received from exchanging books, Map with shells from all over the world; Glee Patton and Thomas Rice, Corals. The exhibits attracted many student and other spectators and brought many favorable comments from registrants and from the University community.

In the foyer of the Student Union Building, Agnes Ward had beautifully arranged "Shells in Art" on large screen dividers. Dr. George Quimby of the Thomas Burke Memorial Washington State Museum arranged an interesting display of Indian artifacts in the Dining Hall of McMahon Hall where the "Potlatch" was held.

The Auditing Committee for the 1967 Annual Meeting, appointed by Chairman Kohn, consists of Jean M. Cate, chairman, Allyn G. Smith, and Rudolf Stohler. The Nominating Committee for the 1966 Annual Meeting was Myra Keen, chairman, Rudolf Stohler, and Crawford N. Cate.

Respectfully submitted,

Elsie Marshall, Secretary, AMU-PD

AMERICAN MALACOLOGICAL UNION, INC.
PACIFIC DIVISION
BYLAWS

Adopted June 22, 1966
Ratified August 22, 1966

ARTICLE I

Section 1. *Organization.* This organization shall be known as the American Malacological Union, Inc., Pacific Division, and as such is an integral part of the national organization, The American Malacological Union, Incorporated.

Section 2. *Purpose.* The purpose in forming the Division is to give members of The American Malacological Union living in the Pacific area opportunity to attend annual regional meetings.

Section 3. *Pacific Division area.* The geographical area covered by the Pacific Division shall be bounded on the south by the Mexican border, on the north by the Canadian border, and on the west and east, in general, by the 170th and 105th meridians, except that Guam, and all of the states of Montana, Wyoming, Colorado and New Mexico shall be included, with Texas excluded. This area shall hereinafter be referred to as the Pacific Division area. AMU members with A.P.O. and Navy addresses in the Pacific shall be included in this area.

Section 4. *Administration.* For purposes of administration, the Pacific Division shall consist of its officers and the standing and interim committees appointed to carry on the business of the Division.

Section 5. *AMU Constitution and Bylaws.* No provision in these Bylaws shall be interpreted as superseding or abridging any provisions in the Constitution and Bylaws of the national organization.

ARTICLE II

Section 1. *Executive Board.* The administration of the affairs of the Division shall be vested in an Executive Board, which shall consist of the currently elected officers and the three most recent and available Past Chairmen of the Pacific Division. Its Chairman shall be the current Division Chairman.

(1) The terms of office of members of the Executive Board shall be one year, beginning one month after the close of the annual meeting.

(2) Vacancies on the Executive Board may be filled through appointment by the Chairman, preferably from among previous Chairmen.

(3) No person shall be an Executive Board member who has not been a member in good standing of the Pacific Division for at least the two preceding consecutive years.

Section 2. *Executive Board meetings.* The Board shall meet annually during a Division annual meeting, prior to the regular business meeting, and at such other times as agreed upon by a majority of the Board members. Insofar as possible, matters requiring action between Division annual meetings shall be handled through a poll of the Board by the Chairman.

Section 3. *Annual Division meetings.* The time and place of the subsequent annual Division meeting shall be decided by the Board.

Section 4. *Executive Board authority.* The Executive Board shall pass on

all matters involving policy, but its decisions are subject to ratification by a majority vote of the AMU-PD members in good standing attending the annual meeting.

Section 5. *Division officers.* The officers of the Division shall be a Chairman, a First Vice-Chairman, a Second Vice-Chairman, a Secretary, an Assistant Secretary, a Treasurer, and an Assistant Treasurer.

(1) Terms of office of these officers shall normally be one year, beginning one month after election at an annual meeting.

(2) Whenever an annual meeting of the national organization is held within the Pacific Division area, the currently elected Division officers and Executive Board members shall serve for a second year without re-election.

Section 6. *Duties of officers.* The officers shall perform the usual duties of their offices.

(1) *The Chairman* shall preside at annual meetings and be generally responsible for the activities of the Pacific Division. He shall appoint a Nominating Committee and such other committees as he deems desirable. At the end of his term he shall appoint an Auditing Committee and a Mentor-Parliamentarian to serve during the term of his successor. The Chairman shall be guided, additionally, by the policies contained in the Officers' Manual.

(2) *The First Vice-Chairman* shall act for the Chairman if the latter is unable to serve after all preliminary organizing of the annual meeting has been completed.

(3) *The Second Vice-Chairman* shall assume all responsibilities for organizing an annual meeting of the AMU-PD if for any reason the Chairman-elect should become unable to assume the duties of his office at any time before the meeting has been organized. He shall thereby succeed to the office and title of Chairman of the AMU-PD.

(4) *The Secretary* shall take all minutes of Executive Board and business meetings, transcribe them as promptly as possible and transmit copies to the Chairman (for review) and to the Mentor-Parliamentarian (for his permanent record). The Secretary shall also take such notes during annual meetings as may be appropriate, obtain abstracts of papers presented at annual meetings, prepare an annual report of the Pacific Division meeting, and submit this report to the AMU Secretary for inclusion in the AMU Annual Reports. The Secretary shall also handle all necessary correspondence, as directed by the Chairman or otherwise required, keep the other members of the Executive Board informed on matters that concern them, and maintain the records of the Division. The Secretary shall be guided, additionally, by the policies contained in the Officers' Manual.

(5) *The Assistant Secretary* shall be responsible to the Secretary and shall handle such reasonable secretarial duties as the Secretary may assign in order to provide for an equitable division of the secretarial load.

(6) *The Treasurer* shall be responsible for handling and recording all incoming and outgoing funds of the Pacific Division, subject to approval by the Auditing Committee of any unprecedented or unusual expenditure. He shall receive such AMU dues and Division assessments as may come to him and shall forward these promptly to the AMU Treasurer. He shall keep an up-to-date list of the AMU-PD members in good standing, and

shall keep the Division Secretary informed of the current status of this list.

(7) At the annual meeting of the Executive Board and at the annual membership meeting the Treasurer shall submit a financial report on the general Division fund. Within 30 days after the annual meeting the Treasurer shall prepare a financial report, in triplicate, of the general Division fund and all other funds handled during the conference, and shall submit this report to the Auditing Committee for approval and to the outgoing Chairman for signature and transmittal to the newly elected Chairman. This shall constitute a final financial report, including all monetary transactions of the Division during his term of office. The Treasurer shall be guided, additionally, by the policies and procedures contained in the Officers' Manual.

(8) *The Assistant Treasurer* shall be responsible to the Treasurer and shall handle such reasonable financial duties as the Treasurer may assign in order to provide an equitable division of these duties.

(9) *The Auditing Committee* shall consist of three qualified AMU-PD members, appointed by the outgoing Chairman. It shall be the primary duty of this committee to consider any unprecedented or unusual expenditure, and ascertain the legality of such proposed expenditure before authorizing payment by the Treasurer. This committee shall review all financial reports prepared by the Treasurer. Subsequent approval shall be obtained at the next annual Division meeting from the Executive Board and by majority voice vote of the AMU-PD members in good standing attending this meeting.

(10) At the annual meeting the outgoing Chairman shall appoint a *Mentor-Parliamentarian* who will be an ex-officio member of the Executive Board, without vote. The Mentor-Parliamentarian will serve in an advisory capacity to incoming officers and committees on questions relating to the Bylaws, and to procedures as reflected in the Minutes and other records of the Division. Notwithstanding anything in these Bylaws, the same person may be reappointed to this position by subsequent Chairmen.

Section 7. *Nominating Committee.* At least one candidate for each Division office shall be nominated by a Nominating Committee of three, appointed by the Chairmen from the list of Past Chairmen. The Committee shall present its slate of nominations at the annual business meeting. Election may be by a majority voice vote, but if there is more than one candidate for office, a majority vote by written ballot will determine election.

(1) No candidates shall be nominated without prior consultation as to their willingness to serve.

(2) AMU-PD membership in good standing for a period of not less than two immediately preceding consecutive years shall be required for officer candidates.

(3) If a written ballot is required, the Chairman shall appoint a Tally Committee, apart from nominated officers, to count ballots and certify the result.

ARTICLE III

Section 1. *Membership.* Classes of membership in the Pacific Division area of the AMU will be those specified in the AMU Constitution and Bylaws.

Section 2. *Award of Honor.* An AMU-Pacific Division Award of Honor is hereby established, to be conferred in recognition of outstanding accomplishments or contributions in the fields of conchology or malacology.

(1) Not more than one such Award shall be conferred in any one year, nor shall one necessarily be conferred each year. Two or more members of a family working together may receive an Award jointly.

(2) Nominations for an Award, accompanied by suitable documentation, shall be submitted in writing to the Executive Board, signed by not less than five AMU-PD members in good standing, at least one month before the scheduled Division meeting at which the Award is to be conferred; nominations may also be presented by any one member of the Executive Board. The Board shall ballot by mail on the nomination, and a simple majority affirmative vote of the Executive Board shall be sufficient for adoption of the nomination.

ARTICLE IV

Section 1. *Dues.* Annual membership dues will be those stated in the Bylaws of the AMU.

Section 2. *Assessment.* An additional amount may be assessed by writtten ballot majority vote of the AMU-PD members in good standing after approval by the Executive Board and favorable action on a motion to refer the question to the appropriate members in an annual meeting. Upon approval, the annual assessment shall take effect on the following January 1. Any annual assessment may be changed or rescinded by a similar course of action. The current annual assessment shall be fifty cents (.50) per member, only Honorary Members excepted.

(1) Any Pacific Division annual assessment shall be based on the current list kept by the Division Treasurer as provided in Article II, Section 6 (6) of these Bylaws and shall be collected, in addition to the regular AMU dues, by the AMU Treasurer.

(2) The Pacific Division annual assessment shall be used for the purpose of promoting and handling annual meetings and for such other purposes related to the administration of the activities of the Pacific Division as may be approved by the Auditing Committee and by the Executive Board.

Section 3. *Costs of annual meetings.* In the handling of annual meetings of the Division, the intention shall be to cover all legitimate costs by any or all of the following means: (a) a registration fee to be paid by all who attend the annual conference either full or part time, except Honorary Members and officially invited guests attending, in an amount established by the Chairman after consultation with the Division Treasurer and the Auditing Committee; Pacific Division members who have paid an annual assessment will have the amount of the assessment deducted from the registration fee; (b) an assessment, as covered in Section 2 of this Article; (c) donations or gifts, and (d) loans from the AMU.

ARTICLE V

Section 1. *Amendments.* Any proposal to amend, add, or repeal any Bylaw of the Pacific Division shall be prepared by a Bylaws Committee appointed by the Chairman for the purpose of drafting necessary or desired changes.

Otherwise, such a proposal must bear the signatures of at least ten AMU-PD members in good standing.

(1) Any such proposal shall be submitted to the Chairman at least two months before an annual meeting, for referral to the members of the Executive Board for their consideration and for verification of constitutionality. If approved by the Executive Board, the proposal may be presented at the next annual meeting. If no objection is raised in open meeting, the proposal may be adopted by a two-thirds majority voice vote of the AMU-PD members in good standing who are in attendance. If objection is raised by any such member, the proposal will be carried over for adoption or rejection by a simple majority vote at the next succeeding annual meeting of the Pacific Division.

(2) The vote to adopt or reject any proposed changes in these Bylaws may be based on the proposed changes as a whole, or separately on changes in individual articles or sections that are contained in the proposal.

AMERICAN MALACOLOGICAL UNION—PACIFIC DIVISION
ABSTRACTS AND CONDENSATIONS OF PAPERS
PRESENTED AT 19TH ANNUAL MEETING

Seattle, Washington, 1966

FOOD PREFERENCE AND FEEDING BEHAVIOR
OF FOUR NUDIBRANCHS

VIRGINIA WATERS

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(ABSTRACT)

Since there has been little work done on the food and feeding behavior of nudibranchs in this country, a study was made during the summer of 1965 at the Friday Harbor Laboratories of the University of Washington on the four species of nudibranchs found at one collecting spot, *Eubranchus olivaceus*, *Cuthona concinna*, *Coryphella fusca*, and *Dendronotus arborescens*. Attention was focused primarily on observations on the food in nature, food preference when given a choice between the species of potential food found at that area, and feeding behavior. Since the food of these nudibranchs consisted of one or more species of hydroids, in this case *Obelia commissuralis*, *Syncoryne eximia*, and *Bougainvillia gloriotta*, it was especially of interest to observe the adaptations of the predators which counter the defenses of the prey (nematocysts and perisarc). It was also of interest to compare the distribution and abundance of the four nudibranchs relative to the hydroids found there with the observed food preference in the laboratory, with the idea of obtaining some information on what may govern their local distribution.

It was found that *Eubranchus* was by far the most abundant nudibranch, and it occurred only on *Obelia*, which was the most abundant hydroid. It also showed a very marked preference for *Obelia* during the food preference studies. On the other hand, the other nudibranchs were found most abundantly on the other hydroids, although both they and the hydroids were relatively scarce. However, they ate all of the hydroids including *Obelia* with equal preference in the laboratory, indicating that there must be some factor or factors preventing them from feeding on *Obelia* in the field, possibly competition with *Eubranchus*.

The nudibranchs generally fed on both the hydranths and coenosarc; hydranths were not avoided except in the case of *Cuthona*. Hydranths were eaten either from the aboral end by being pulled through a hole made in the perisarc at the base of the hydrotheca with the radula, or they were approached from the oral end, drawn into the mouth with the radula, and bitten off including the perisarc. In both cases the hydranths were taken in whole. The coenosarc was eaten by drawing pieces of it through a hole in the perisarc with the radula. There was no avoidance of hydranths, and the perisarc was easily bitten through. Thus these two defenses did not seem important as protection from nudibranch predation. Probably rapid growth and regeneration rates are the most important defenses against nudibranchs.

THE EGG MASSES AND VELIGERS OF OPISTHOBRANCHS

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Friday Harbor Laboratories

University of Washington

(ABSTRACT)

Opisthobranchs may be identified from their egg-masses or veligers alone. The information needed may be classified in categories reflecting the systematic position of the adults. An opisthobranch egg-mass comprises a mass of jelly enclosing capsules containing eggs. It is laid in one of four forms: Type A (dorids): ribbon-like, attached along length of one edge, capsules through most of it, usually coiled; Type B (aeolids, sacoglossans): capsule-filled cord, usually attached along one side by a thin capsule-free jelly sheet, frequently coiled; Type C (cephalaspideans): ovoid or globular jelly bag attached by a jelly string; Type D (very small aeolids): sac-like, often like a small section of a Type A or B egg-mass. Within each type, certain field or other characteristics distinguish the parent. Useful field characteristics are: time and place of laying, color, dimensions, presence or absence of an obvious egg-string, number of days until hatching; useful laboratory data include: number of eggs/capsule, capsule spacing, appearance of capsule wall, egg and capsule dimensions, veliger type, number of days to reach veliger stage. Other features separate species within particular types, e.g., Type B: relative lengths and widths of the capsule-filled and capsule-free regions, presence or absence of secondary twisting of the egg-string method of attachment. While some characteristics vary within limits, consideration of many features allows reasonably certain identification.

Opisthobranch veligers include two shell-types (Thompson, 1961): Type 1: uninflated shells of $\frac{3}{4}$ –1 whorl; Type 2: inflated, somewhat egg-shaped shells. Type A and C egg-masses produce Type 1 veligers; Type B egg-masses produce Type 2 veligers (some may produce Type 1). Veligers may be identified using anatomical, behavioral and shell characteristics. Within each type anatomy is similar, relative dimensions being difficult to measure. Veligers of sacoglossans and cephalaspideans have darkly pigmented kidneys; in all species constant characteristics include: position of shell attachment of columellar muscle, shape, size and swimming angle of velar lobes, distribution of sensory cilia, shape and size of foot and operculum. Some possess distinctive features such as: color of digestive gland (*Rostanga*—red, *Haminea*—yellow), possession of eyes (observed only in *Cuthona concinna*). Veliger behavior includes various activities before and after hatching. Within capsules veligers are (specifically) inert, spinning or swimming; on hatching they may swim to the surface, move throughout the water or group on the substratum. In swimming they may move rapidly in straight lines, turn in large or small circles or move slowly over the bottom. During hesitation periods (Carter, 1926) in active swimming, the velar cilia may be held characteristically. The typical behavior of individual species allows broad identification. The transparent shells of veligers are distinguishable, especially when freshly empty. Their dimensions are intra-specifically constant (the longest axis being 100–200 μ in Type 1, 200–300 μ in Type 2), not very variable and no appreciable growth occurs (at least in the laboratory). Sculptural patterns

are remarkably constant within species. Further differences include: length, width, depth ratio, shape of the shell rim and its position and angle of attachment to the body whorl, relative size of aperture and body whorl, degree and angle of curvature of the shell dorsally.

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CONTROL OF BLOOD SUGAR IN THE OCTOPUS

C. KEITH GODDARD

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(ABSTRACT)

Several substances have been tested for possible effects of the blood sugar of *Octopus dofleini*; among them were certain catechol amines, insulin and glucagon. Only insulin appears to have an affect (hypoglycemia).

Certain tissue extracts from the same species have also been tested. The only extract found to have a reproducible effect was that prepared from the branchial heart appendages. This was found to cause hyperglycemia under certain conditions and hypoglycemia under other conditions. The investigation is being continued.

CHITONS IN COLOR

ALLYN G. SMITH

California Academy of Sciences

(ABSTRACT)

One of the most prolific and varied chiton faunas in the world is to be found on the West Coast of North America. Many of these west coast species have not been illustrated adequately; many more have not been illustrated at all. For several years the author has been photographing prime specimens of west coast chiton species for a color slide collection established in the Department of Invertebrate Zoology, California Academy of Sciences. The presentation covers a series of selected slides from this collection.

COMMENTS AND ILLUSTRATIONS, PRINCE WILLIAM SOUND, ALASKA

ROBERT R. TALMADGE

Willow Creek, California

(ABSTRACT)

Prince William Sound, Alaska, abruptly came to the attention of the scientific world late in the afternoon of March 27, 1964. Within a time period of

roughly four minutes, the great Alaskan earthquake elevated major portions of this vast area; some shore lines were lifted in excess of 30 feet above the pre-earthquake tide levels.

In the summer of 1965 I had the opportunity to visit Prince William Sound, observing and collecting animals, and at the same time taking color slides. This informal discussion is general, covering numerous biological as well as geological features, and is illustrated by color slides.

ALASKA EARTHQUAKE INVESTIGATION—1965

WALTER J. EYERDAM
Seattle, Washington

(ABSTRACT)

Several weeks after the earthquake struck Prince William Sound in the Gulf of Alaska in February, 1964, Dr. G Dallas Hanna, Curator of the Department of Geology of the California Academy of Sciences, flew to Cordova. With cooperation of the U.S. Fish and Wildlife Service he spent several months making preliminary investigations by boat and helicopter of the extent of destruction wrought by the earthquake and great tidal waves. At Mcleod Bay on Montague Island the shores were lifted 35 feet above high tide mark.

Last summer more thorough investigations were made at over 30 shore stations in Prince William Sound. A hydrographer and three marine biologists under leadership of Dr. Hanna and the crew of the chartered expedition fishing boat *Harmony* made shore measurements and quite thorough investigations and collections of the shore life. We collected about 130 species of shells on the upraised beach at Mcleod Bay. I will publish a report later. Observations were also made of the effects on the pelagic mammal life.

It was noted that the sea otters are making a notable comeback in spite of harassment of the ubiquitous killer whales that feed on king salmon, seals, and sea otters. A complete collection of higher plants was made at every station by the author in the shore area below the old tide mark. Over a hundred species were collected and reported on.

The tidal waves did tremendous damage to the shores and the earthquakes caused thousands of avalanches and landslides. All of the sediments of the former prolific clam beds were completely destroyed and not a larva could be found. Nature repairs the damage by producing great quantities of hardy species of algae, *Balanus cariosus*, and *Mytilus edulis* together with a few smaller mollusks with swimming larvae. Also most of the crab species survived. The Dungeness crab below lowest tide mark produces bumper crops for the crab fishermen.

Very few shells were found living in the tidal zone except all of the limpets, chitons, and *Thais*. With fast growing species of algae appearing on the devastated beaches, nature's balance will be more or less restored year by year, but the clam beach sediments in most areas are gone, leaving only bare jagged bedrock to support a different biota.

A comprehensive report on the earthquake investigation in Prince William Sound will be published and probably available before the end of 1966. As

leader of this expedition, Dr. G Dallas Hanna did a very good detailed and comprehensive work on this study of the earthquake area covered.

There will be no special expedition this summer continuing our work, but it is likely that in several more years, if funds are available, there will be further investigations made on the rate of biological rehabilitation of shore life.

THE GEODUCK

CEDRIC E. LINDSAY

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(ABSTRACT)

The most impressive hard-shell clam in the Pacific Northwest is the geoduck (*Panope generosa*) which is abundant in Puget Sound.

Although the name implies "earth-duck" it is actually thought to be an Indian name which has the phonetic spelling "goiduck" or "gwetuck." Locally it is pronounced "gooeyduck." The center of abundance of geoducks is Puget Sound although they have been found as far north as the Queen Charlotte Islands of British Columbia and as far south as Elkhorn Slough in California. These clams grow in low or wet ground, usually from the zero tide level on down to at least 180 feet below low tide. The most dense colonies presently known occur from the -2' tide level to depths to about 60 feet below mean lower low water. The substrate in which they live may be pure mud, sand, small gravel, or a mixture of these. They prefer sandy or muddy ground and burrow to a depth of from 18 inches to 6 feet below the surface. Due to heavy digging pressure, the intertidal abundance varies widely even in areas where they were once known to exist in large numbers. However, where we are able to estimate abundance in undisturbed places, it is found that more than one clam per square foot is usual. Maximum adult size reported is about 13 lb. with large ones frequently taken in the 6 to 8 lb. class. Average weight for adult "ducks" is about 3 lb. The bulk of this weight is in the body rather than the shell. The shell essentially covers the visceral parts with fused mantle and large siphon bulging outside the shell.

There is no comprehensive monograph on life history and ecology of geoducks. Observations of biologists of the Washington Department of Fisheries indicate that sexes are separate, but sex reversal may occur. Spawning is known to occur with rising water temperature in May or June although mass spawning may not occur except during warmer years. The observations on occurrence of young geoducks indicate that setting of larvae is predominantly during the warmer years. Repopulation of a beach is dependent on the set from successful mass spawning. Growth is believed to be slow, and it is estimated the average geoduck reaches 3 lb. in a period of 10 to 15 years. Maximum age reached is unknown, but weight and thickness of shells of old clams indicate they probably survive beyond 20 years. Maximum weights are reached in areas where plankton food is sustained and abundant. Recent experiments with tagged geoducks transplanted from one area to another showed survival to be poor and there was severe setback in growth.

When searching for geoducks on the tideflats, identification is made by the appearance or feel of the siphons which are covered with a smooth, light brown skin and do not have seaweed, barnacles, or horny plates attached to

the outside of the siphon, or tentacles around the inner-margins of incurrent or excurrent openings. Geoducks should not be confused with piddocks which are found in hard, clayey ground, but which also have a smooth siphon. Geoducks are dug during lowest tides of the year on most beaches which are accessible to the public. They are present in varying numbers in the Puget Sound country from Samish Bay to Olympia, in Hood Canal, and along Admiralty Inlet, the Strait of Juan de Fuca, and San Juan Islands. Due to the heavy digging pressures, however, they are readily found on public beaches only at or below extreme low tide line. Therefore, most personal use digging is restricted to less than 20 tides per year. After locating a geoduck by the appearance or feel of the siphon, a geoduck "can" (a large stove pipe or open-ended tube 12 to 14 inches in diameter and 3 feet long) is forced down around the hole where the geoduck is seen. Once the can is in position, it is forced as deeply as possible by the weight of the digger. Substrate is scooped out with a shovel and the can again pushed down. The process is repeated until the geoduck neck and the upper part of the shell may be firmly grasped by the digger. In case of geoducks which are deep, this may require extending head and shoulder down into the can and stretching full length of the arm before being able to grasp the shell. By carefully wriggling, pumping, and pulling, the suction is eventually broken and the clam gradually drawn up from the burrow. Care must be taken to avoid breaking the shell or pulling off the siphon. Contrary to popular belief the geoduck itself does not dig down to escape capture since in the adult size the foot is too small to permit active digging. However, retraction of the long siphon frequently gives the impression that the clam is seeking to escape.

Virtually the entire animal is edible with favorite portions being the neck (siphon) and breast (mantle). These may be skinned after a quick blanch in hot water, then washed and cut into strips or chopped for frying, or ground for chowder. They may also be eaten smoked or raw.

LAND SNAILS OF THE GALÁPAGOS—DISTRIBUTION AND EVOLUTION

ALLYN G. SMITH
California Academy of Sciences

(ABSTRACT)

The Galápagos Archipelago, consisting of fifteen major islands and many smaller ones, supports an interesting land-snail fauna. All species are endemic except for several recently introduced by man. The family Bulimulidae is dominant, other species being quite small. There are about 50 well differentiated species in the Bulimulidae that vary remarkably in size, color and sculpture. Distribution on a particular island, both within and between species, is governed by the amount of rainfall at various levels of elevation resulting in a clear-cut zonation of the flora, the lines of demarkation between zones being generally quite sharp. Until recently, all Galápagos Bulimulidae were placed in the subgenus *Naesiotus* Albers based on the characteristic configuration of the nuclear-whorl sculpture. Recently the subgenus has been raised to generic status and several new species of *Naesiotus* have been described from the west coast of the South American mainland.

It seems fairly obvious that the Galápagos land-snail fauna originated on the mainland. Probably various species arrived at different times since the Miocene from different mainland stocks. Once established, the forces of evolution, together with some inter-island distribution, have resulted in changes in the original mainland forms, some of these quite drastic. There is now so much variation in the Bulimulidae on the Galápagos that an attempt to trace species evolution is difficult. From the current study now being made it is hoped some conclusions can be drawn. Available for study are extensive collections of Galápagos land snails made during the California Academy of Sciences 1905-06 Expedition, the California Academy-Templeton Crocker Expedition of 1932, and by the writer during the Galápagos International Scientific Project of 1964. Illustrated with slides.

GLIMPSES OF THE GALÁPAGOS

ALLYN G. SMITH

California Academy of Sciences

(ABSTRACT)

This is an account, illustrated with selected color slides, of a five-week sojourn on the Galápagos under the auspices of the Galápagos International Scientific Project of 1964. Most of the time there was devoted to the study of land and marine invertebrate life on the large island of Santa Cruz (Indefatigable), with a four-day side trip to Tower Island. Occasional time was taken to photograph island life—giant tortoises, marine and land iguanas, lizards and geckos, Darwin's finches and other land and sea birds, flora, and people. The marine environment is included for the benefit of conchologists. A few remarks on living in the Galápagos are added to round out the picture.

QUALITATIVE ANALYSIS OF THE URIC ACID, XANTHINE, AND GUANINE CONTENT OF SEVERAL SNAILS

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(ABSTRACT)

For several years it has been assumed that snails excrete ammonia, urea, and uric acid. It has also been suggested that as marine snails colonized fresh water via a land route, they shifted their major excretory product from ammonia to uric acid and then back to ammonia again (Needham, 1935, Biochem. J., 29: 238). Jezewska et al. (1963, Acta Biochem. Pol., 10: 55) has shown that more than 90% of the excretion of the terrestrial pulmonate *Helix pomatia* consists of uric acid, guanine, and xanthine, and not ammonia or urea. Recently Duerr (1965, Ph.D. dissertation, U. of Minn.) has shown that the freshwater pulmonate *Lymnaea stagnalis* excretes less than 1 μg N/24 hours in any form, but probably stores uric acid in its kidney.

Assuming that a concentration of purine in a snail indicates its probable

TABLE 1

Qualitative analysis of the uric acid, xanthine, and guanine content of several snails

Species	Where Collected ^a	Family	Xanthine	Guanine	Uric Acid
<i>Acanthina spirata</i>	MB	Muricidae	+	+	+
<i>Thais emarginata</i>	DB	Muricidae	+	—	+
<i>Thais lamellosa</i>	CB	Muricidae	—	—	+
<i>Olivella biplicata</i>	CB	Olividae	—	—	+
<i>Tegula funebris</i>	MB	Trochidae	+	+	+
<i>Tegula brunnea</i>	MB	Trochidae	—	—	+
<i>Littorina scutulata</i>	MB	Littorinidae	—	—	+
<i>Acmaea limatula</i>	SD	Acmaeidae	—	+	+
<i>Fissurella volcano</i>	SD	Fissurellidae	+	+	+
<i>Lymnaea stagnalis</i>	W	Lymnaeidae	—	—	+
<i>Lymnaea palustris</i>	W	Lymnaeidae	—	—	+
<i>Helix aspersa</i>	SD	Helicidae	+	+	+

^a Abbreviations: MB—Moss Beach, Calif.; DB—Dillon Beach, Calif.; CB—Coos Bay, Oregon; SD—San Diego, Calif.; W—laboratory raised snails originally collected near Waubay, So. Dak.

use as an excretory product, this paper represents a preliminary attempt to determine whether snails other than *H. pomatia* accumulate xanthine and guanine.

Homogenates of several snails of each species were made to 70% ethyl alcohol to precipitate the proteins and polysaccharides. The supernatant was concentrated and made to 1% Li_2CO_3 to dissolve the purines. The supernatant was then spotted on Whatman #1 chromatograph paper, chromatographed (propanol–water 3:1) for 24 hours, stained with rhodamine B, and the purines were observed with a UV lamp. The sensitivity of this technique was such that a purine content higher than 0.1% of the dry tissue weight of the snail could be detected.

The results are tabulated in Table 1. Spots other than uric acid, xanthine, and guanine were observed in certain snails, but to date are unidentified. It can be noted that all of the snails examined contained uric acid, but half contained xanthine and/or guanine as well.

These results indicate that anyone studying excretion in gastropods must consider whether purines other than uric acid are involved.

A REMARKABLE SNAIL FAUNA FROM COAHUILA, MEXICO¹

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(ABSTRACT)

The valley of Cuatro Ciénegas, about 20×30 miles, is enclosed by ranges of the Sierra Madre Oriental on the eastern edge of the northern plateau of

¹ Research supported (in part) by National Science Foundation grants GB 2461 and GB 3006.

Mexico about 200 miles south of the Big Bend in Texas. The freshwater mollusks of this small valley show the most spectacular endemism known so far in the Western Hemisphere. Out of about 18 forms, 13 have been identified to species, only 1 previously known to science. The 12 new species are all Hydrobiidae (Prosobranchia: Rissoacea) in the broad sense, including representatives of 5 new genera, 3 of which belong to monotypic subfamilies. The nearest parallel to such a localized concentration of endemic forms is Lake Titicaca, Bolivia-Peru, with 6 localized genera of Hydrobiidae. These are all members of the widespread subfamilies Cochliopinae and Littoridininae, so that the Cuatro Ciénegas area is more impressive in supergeneric endemism.

The new genus *Mexipyrus* (Hydrobiidae: Littoridininae) is geographically intermediate between *Tryonia* and *Pyrgophorus*, with which it shares some features. Local speciation is remarkable: 7 populations of *Mexipyrus* represent 6 species, within a radius of 4 miles. Elsewhere in North America such differentiation of freshwater mollusks is unknown; these new forms are more like the localized land snails of mountain ranges in Arizona and New Mexico.

The strikingly local endemism of the freshwater mollusks is paralleled in other aquatic animals, so far as they have been studied. The fish fauna is exceptionally diverse for desert springs: of about 20 species, half are endemic, although none of the genera are restricted. Of 4 turtles, 3 are endemic. Among the Crustacea a subterranean isopod has been described as a local species of *Speocriolana* (Cirolanidae), a genus restricted to underground waters of northeastern Mexico. This form hints at the possibility of a subterranean mollusk fauna.

The study of the novel mollusks from the Cuatro Ciénegas area required a review of the classification of the North American Hydrobiidae, and an appraisal of characters useful in grouping genera into tribes or subfamilies. The description of the fauna (Taylor, 1966) includes diagnoses of the North American subdivisions of Hydrobiidae and lists of included genera, thus allocating most of the known forms of the Western Hemisphere. An outgrowth of this taxonomic revision is conclusions concerning the affinities of the Bithyniidae, Caecidae, and Vitrinellidae.

The Bithyniidae have been classified within or adjacent to the Hydrobiidae (Rissoacea) for decades. Numerous weighty differences between the two groups include features of average body size; operculum (both composition and mode of growth); body size; form of tentacles; pattern of pigmentation; presence of ciliary feeding apparatus including epitaenia, food-groove, numerous long ctenidial lamellae, and siphon; nuchal lobes; innervation and inferred homology of penis; mode of egg-laying and structure of egg-capsules; shape and structure of fecal pellets; and sperm dimorphism. Similarities of Bithyniidae in these characters to the Pilidae and Viviparidae lead to the grouping of all three families in the Viviparacea.

Glenchiella Abbott (1948) is assigned to the Cochliopinae in the Hydrobiidae. It has the unusual features of a multispiral operculum with subcentral nucleus, planispiral shell, and a series of 6-7 low swellings on the proximal posterior border of the left tentacle. These features are strikingly reminiscent of the Caecidae and Vitrinellidae as described by Moore (1962), and provide evidence for suggesting that all three groups have a common ancestry.

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RESEARCH ACTIVITIES AT THE SHELLFISH LABORATORY

VICTOR L. LOOSANOFF

Professor of Marine Biology, University of the Pacific

(ABSTRACT)

This is a narrative of the various phases of research carried on at the laboratory devoted to the studies of biology, especially physiology of reproduction and of ecology, of marine mollusks and the forms with which they associate in their normal environment, including enemies. Various facilities available at the laboratory, including different types of boats used for field observations and collection of the samples, are demonstrated. The importance of various instruments and apparatus needed for different types of research is stressed. Certain microscopic structures of molluscan bodies, especially those of oysters and clams, are shown and their functions discussed. Facilities used in a pilot shellfish hatchery are shown; larval stages of several species demonstrated; some of the diseases described, and the future of genetic studies, devoted to the development of the races displaying rapid growth, resistance to diseases, etc., are stressed. The lecture is illustrated by numerous color slides.

WHY ARE THERE SO MANY SPECIES OF *CONUS*?

ALAN J. KOHN

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(ABSTRACT)

This question has two important facets, a classification or nomenclatural aspect, and an evolutionary and ecological one. The two are interrelated by the modern biologist's attempt to construct classifications that reflect the evolutionary history of animal groups and the biological relationship of their extant members.

The classification problem. Most molluscan systematists place all extant Conidae in the genus *Conus*, and since no entirely successful infrageneric classification has been developed, this seems the wisest course at present. The number of described species is approaching 3,000, of which slightly more than one-third have been described only as fossils. Problems in determining the identity of nominal species arise from the nature (or absence) of original specimens, inadequate descriptions, and particularly for 18th century species, indications and synonymies. I am attempting to solve these problems through application of a chronological approach to the described species, which has now been carried out for the years 1758-1791, during which 98 species were described; 59 of these are now considered valid Recent species.

The evolutionary-ecological problem. The question, why have so many species of *Conus* evolved, is perhaps more meaningfully restricted to: Why are there so many species of *Conus* in one place? Preliminary results of analyses of *Conus* populations occupying different types of habitats throughout the range of the genus suggest that topographic complexity of the habitat is an important determinant of the number of co-occurring species. No trends toward increased food specialization in species co-occurring with larger numbers of congeners have been found, nor do such species overlap more with each other with respect to prey. Rather, the associations of larger numbers of *Conus* species exploit a more diverse array of prey species.

SOME NOTES ON THE MOLLUSCAN COLLECTIONS AT THE UNIVERSITY OF COPENHAGEN

A. MYRA KEEN

Department of Geology, Stanford University

(ABSTRACT)

Lorenz Spengler, a Danish collector of the eighteenth century with connections that brought him material from the rich areas of the western Atlantic and western Pacific, built up one of the fine shell cabinets of northern Europe. Many of his specimens were borrowed for illustration in the "Conchylien Cabinet" of Martini and Chemnitz (1769-1795). Schumacher (1817) also leaned heavily upon the Spengler collection in his descriptions of many molluscan genera now in common usage. The Spengler collection alone would make the University of Copenhagen's holdings an important place for systematic research. In addition, there are other suites of more than passing interest. Workers on the West Coast of the Americas would take especial note of the material collected by Dr. A. Oersted in a trip to Central America. This was described by Mörch in 1859 to 1861, who named around 50 new species of marine mollusks. His types have remained largely unfigured. A recent search has brought to light all but four of the shelled forms. Some turn out to be synonyms of earlier-described forms, a number represent species not yet re-taken or recognized by authors, and a few are forms now known by later names. The one new genus Mörch proposed, *Hippella*, proves to be prior to *Condylocardia* Bernard, 1896. A petition has been submitted to the International Commission on Zoological Nomenclature to have this suppressed as a forgotten name.

THE STORY OF THE WEST AMERICAN MARGINELLIDAE

EUGENE COAN

Department of Biological Sciences, Stanford University

AND BARRY ROTH

(ABSTRACT)

The West American species of the gastropod family Marginellidae have been reviewed in a recent paper in *The Veliger*. The problems involved in this survey are discussed, and the species illustrated by means of colored slides. The biogeographical implications of the family are outlined.

FURTHER STUDIES ON THE POLYSACCHARIDES OF WEST COAST PROSOBRANCHS

DAVID N. EMERSON¹

Department of Zoology, University of South Dakota

(ABSTRACT)

A previous study of the polysaccharides of west coast prosobranchs collected during July–August (Emerson, 1965, The Veliger 8:62) indicated that carnivorous snails had higher levels than herbivores. Glycogen seemed to be the major polysaccharide. To further evaluate these findings, snails were collected during December. Polysaccharides were quantitatively measured as before. Table 1 summarizes the polysaccharide content of several species and compares these values with those obtained previously. Males and females were not significantly different.

Table 1 indicates that closely related taxonomic groups are similar in polysaccharide levels, and that the carnivores have higher levels than herbivores. The Littorinidae are exceptions, since their polysaccharide levels overlap those of the carnivores. Differences between the December and the

TABLE 1

Total polysaccharide content of several species of marine prosobranchs. The figures behind the \pm signs give confidence limits at the 95% level. The numbers in parentheses indicate the number of determinations.

Species	Family	% polysaccharides of dry weight (combined males and females)	
		December	July–August
CARNIVORES			
<i>Acanthina spirata</i> (24)	Muricidae	5.92 ± 0.81 (MB)	————
<i>Thais emarginata</i> (22)	Muricidae	4.13 ± 0.46 (DB)	^a 2.90 ± 0.43 (CB)
<i>Thais lamellosa</i>	Muricidae	————	^a 6.05 ± 1.16 (CB)
<i>Searlesia dira</i> (24)	Neptuneidae	3.20 ± 0.52 (MB)	^a 5.01 ± 0.76 (CB)
HERBIVORES (Snails)			
<i>Littorina planaxis</i> (19)	Littorinidae	3.85 ± 0.86 (MB)	^b 2.98 ± 0.27 (SD)
<i>Littorina scutulata</i> (23)	Littorinidae	3.69 ± 0.42 (MB)	^a 3.19 ± 0.30 (CB)
<i>Calliostoma ligatum</i> (3)	Trochidae	1.37 (MB)	^a 1.42 ± 0.15 (CB)
<i>Tegula funebris</i> (24)	Trochidae	1.26 ± 0.18 (MB)	^a 1.93 ± 0.16 (CB)
<i>Tegula brunnea</i> (24)	Trochidae	0.82 ± 0.11 (MB)	————
<i>Tegula eisenii</i> (24)	Trochidae	————	0.43 ± 0.06 (SD)
HERBIVORES (Limpets)			
<i>Fissurella volcano</i> (18)	Fissurellidae	————	1.54 ± 0.30 (SD)
<i>Acmaea digitalis</i> (16)	Acmaeidae	0.83 ± 0.15 (MB)	————
<i>Acmaea limatula</i> (15)	Acmaeidae	————	0.73 ± 0.16 (SD)

^a These figures are from Emerson, 1965.

^b This figure is from Emerson and Duerr, 1966, in press.

Abbreviations for location: (MB) Moss Beach, Calif., Dec. 1965; (DB) Dillon Beach, Calif., Dec. 1965; (CB) Coos Bay area, Oregon, July–Aug., 1964; and (SD) San Diego, Calif., July, 1965.

¹ This investigation was supported in part by predoctoral fellowship (Number 1-F1; GM-21.084-13) from the National Institutes of Health. Present address: Department of Biological Sciences, University of Alaska, College 99701.

July–August values are significant at the 95% level for *T. emarginata*, *S. dira* and *T. funebris*. These differences may be seasonal, or due to different areas of collection.

Acid hydrolysates of polysaccharides were chromatographed and quantitated as previously (Emerson, 1965). Aliquots of these hydrolysates were adjusted so that starting spots on the chromatograms contained 5–10 micrograms of total sugars. Larger concentrations resulted in very large glucose spots, and traces of xylose and ribose in some species. Under the more dilute conditions, all species studied contained only glucose in the hydrolysates, except *T. brunnea* males (glucose 95%, xylose 5%); *T. eisenii* males (glucose 57%, galactose 16%, unknown 27%); *A. limatula* (glucose 16%, galactose 20%, xylose 18%, ribose 23%), and *F. volcano* (galactose 52%, ribose 48%). The unusual polysaccharides of the keyhole limpet, *F. volcano*, which contain no glucose are interesting for future study.

STUDIES ON THE STRUCTURE AND FUNCTION OF THE BUCCAL MASS OF TWO GYMNASOMATOUS PTEROPODS (OPISTHOBRANCHIA; GYMNASOMATA)

CAROL M. LALLI

Department of Zoology, University of Washington

(ABSTRACT)

The buccal organs of two gymnasomatous pteropods, *Clione kincaidii* Agersborg and *Crucibranchaea* sp., have been investigated. Both of these pelagic opisthobranchs have been collected from the Friday Harbor, Washington, area.

The buccal mass of *Clione kincaidii* consists of three pairs of cephalocones or buccal cones, one pair of hook sacs containing chitinous hooks, a radula, and one pair of salivary glands. Feeding experiments using *Spiratella helicina*, a thecosomatous pteropod, as prey have revealed the functions of the various buccal organs, and these are discussed.

The feeding apparatus of *Crucibranchaea* sp. differs from that of *Clione* in consisting of two eversible lateral arms bearing numerous stalked suckers and an eversible proboscis. The buccal mass proper is situated within the terminal end of the proboscis and consists of one pair of hook sacs with small chitinous hooks, a radula, and several irregular rows of small chitinous spines or jaws. No feeding experiments have been done, but the probable mode of functioning of the buccal organs is discussed.

NUDIBRANCHS OF THE WEST COAST

ALLYN G. SMITH

California Academy of Sciences

(ABSTRACT)

Until a method of preserving the colors of nudibranchs and other members of the Opisthobranchia can be evolved, students of this group of beautiful mollusks must resort to painted illustrations or to color photography, the latter being the more practicable method. For many small species, close-up photography is needed for adequate enlargements. This presentation covers

a selected series of slides of nudibranchs from the West Coast from the color slide collection in the Department of Invertebrate Zoology, California Academy of Sciences.

TOTAL LIPIDS IN 8 SPECIES OF SNAILS

WILLIAM B. STICKLE, JR.¹ AND DAVID N. EMERSON²
Laboratories of Zoophysiology, Department of Zoology
University of South Dakota

(ABSTRACT)

Few comparative studies exist on lipid content of snails. It has been suggested that basic differences in lipid metabolism may exist among certain molluscs (Martin, 1962; Emerson and Duerr, 1966). The object of the present survey is to determine total lipids of several species of snails and to see if lipid content is a taxonomic characteristic.

Weighed, dry soft parts of snails were hydrolyzed in 20% KOH: 95% ethanol 1:1 (100°C, 2 hours). The hydrolyzates were acidified with 6N HCl (pH = 2) and extracted with chloroform. The extracts were dried and weighed. Table 1 summarizes the total lipid content of 8 species of snails.

TABLE 1

Total lipid content of 8 species of snails. The figures behind the \pm signs give confidence limits at the 95% level. The numbers in parentheses indicate the number of determinations.

Species	Family	Total chloroform extractable material (% of dry weight)	Area and date of collection ^a
FRESH WATER PULMONATES			
<i>Lymnaea palustris</i> (wild)	Lymnaeidae	41.6 \pm 6.0 (26)	W
<i>L. palustris</i> (lab raised)		35.9 \pm 10.8 (11)	W
<i>Lymnaea stagnalis</i> (wild)	Lymnaeidae	22.2 \pm 3.9 (16)	W
MARINE PROSOBRANCHS			
<i>Olivella biplicata</i>	Olivellidae	38.7 \pm 3.7 (33)	CB
<i>Thais emarginata</i>	Muricidae	20.7 \pm 4.0 (28)	DB
<i>Acanthina spirata</i>	Muricidae	16.5 \pm 2.3 (21)	MB
<i>Tegula funebris</i>	Trochidae		MB
females		13.0 \pm 3.4 (12)	
males		9.7 \pm 9.3 (4)	
<i>Tegula brunnea</i>	Trochidae		MB
females		9.6 \pm 2.9 (8)	
males		10.7 \pm 0.5 (15)	
TERRESTRIAL PULMONATE			
<i>Helix aspersa</i>	Helicidae	13.1 \pm 2.5 (16)	SD

^a Abbreviations: W—Wild snails and eggs for lab stock collected from ponds near Waubay, So. Dak.; CB—Coos Bay, Oregon, Aug., 1964; DB and MB—Dillon Beach and Moss Beach, Calif., Dec., 1965; SD—San Diego, Calif., July, 1965, maintained in the lab until April, 1966.

¹ Supported by NDEA fellowship, Title IV, University of South Dakota.

² Supported by NIH Predoctoral fellowship (#1-F1; GM-21,084-13). Present address: Dept. of Biol. Sci., Univ. of Alaska, College 99701.

TABLE 2

Species	Lipid content ^a (% of dry wt.)	Reference
<i>Littorina planaxis</i> (Littorinidae)	16.8	Emerson & Duerr, 1966
<i>Littorina scutulata</i> (Littorinidae)	14.2	unpublished
<i>Planorbis corneus</i> (Planorbidae)	8.1	unpublished
<i>Australorbis glabratus</i> (Planorbidae)	5.5	Calculated from v. Brand, et al. 1957

^a All figures are based on ether extraction methods.

Table 2 summarizes other known values for total lipids in snails.

The lipid content of the Lymnaeidae (Table 1) is much higher than for other fresh water pulmonates (Planorbidae, Table 2). This difference may be partly due to different methods of extraction. The high lipid content of *O. biplicata* (Table 1) and low values for free amino acids (Emerson, 1966, Proc. S. D. Acad. Sci. 45) suggest that this snail is metabolically different from the other marine snails studied. Tables 1 and 2 suggest that species in the same family resemble each other more closely than they resemble species in other families. Similar relationships have been found for polysaccharide content of some of the same species (Emerson, 1965, The Veliger 8; and 1966, Ann. Rep. AMU). These observations suggest that taxonomically related species may be similar in several aspects of metabolism.

ATTENDANCE LIST—1966 ANNUAL MEETING

Therese Anderson, Silverdale, Washington
Gladys Archerd, Berkeley, California
Marlene Averre, Seattle, Washington
Dr. Karl Banse, Seattle, Washington
Charles A. Bedford, Robert's Creek, B. C., Canada
Mr. and Mrs. Fred Berg, Santa Barbara, California
Mr. and Mrs. Ford Bratcher, Hollywood, California
Mrs. Nancy Brown, Seattle, Washington
Mr. and Mrs. Glenn E. Burghardt, San Leandro, California
Mr. and Mrs. Crawford N. Cate, Los Angeles, California
Jeanne Charlton, Tacoma, Washington
Mr. and Mrs. J. E. Coley, Punta Gorda, Florida
Salle Snyder Crittenden, Alameda, California
Rita K. Cunningham, Seattle, Washington
Joan Demond, Los Angeles, California
Miss Harriet Doheny, Mercer Island, Washington
Colleen Doyle, Seattle, Washington
Dr. Frederick Duerr, Vermillion, South Dakota
Phyllis M. Eliason and Nancy, Agana, Guam
David N. Emerson, Vermillion, South Dakota
Walter Eyerdam, Seattle, Washington
Mrs. George W. Fischer, Pullman, Washington
Ada Frisk, Marysville, Washington
Effie Forthun, Seattle, Washington
Dr. C. K. Goddard, Sydney, Australia
Barbara J. Good, San Diego, California
Mr. and Mrs. Jack Greaves, Seattle, Washington
Lela M. Griffith, Egmont, B. C., Canada
James B. Gross, Douglas, Alaska
Kay Gudnason, Oakland, California
Celia Haigh, Seattle, Washington
Col. George Hanselman, San Diego, California
Mr. and Mrs. Lee E. Hill, Everett, Washington
Helen Hoffman, Seattle, Washington
Elizabeth S. Howe, Seattle, Washington
Mary Hoyt, Seattle, Washington
Ann Hurst, Friday Harbor, Washington
Mr. and Mrs. John Jarosek, Bainbridge Island, Washington
Col. and Mrs. Harvey A. Johnson, Seattle, Washington
Mr. and Mrs. Ralph P. Jones, Seattle, Washington
Dr. Myra Keen, Palo Alto, California
Dr. Alan J. Kohn, Seattle, Washington
Carol M. Lalli, Seattle, Washington
Jerry Landye, Pullman, Washington
Mr. and Mrs. Doug Larson, Cambria, California
C. E. Lindsay, Olympia, Washington
Mr. and Mrs. Lew Livingston, Des Moines, Washington
Margaret Lloyd, Seattle, Washington

Dr. and Mrs. Victor Loosanoff, Greenbrae, California
Dan Luchtel, Seattle, Washington
Clarice Lynn, Tacoma, Washington
Helen Mahood, Seattle, Washington
Elsie Marshall, Seattle, Washington
Dr. Arthur W. Martin, Seattle, Washington
Mr. and Mrs. E. E. McCormick, Vashon, Washington
Dr. James McLean, Los Angeles, California
Elsie Jane Michel, Mercer Island, Washington
Mr. and Mrs. Paul Mitchell, Albany, Oregon
Estella Mulvania, Warrington, Florida
William Old, Jr., New York City, New York
Dr. Robert T. Paine, Seattle, Washington
Mr. and Mrs. Maurice Patten, Seattle, Washington
Johanna Reinhart, Friday Harbor, Washington
Mae Dean Richart, San Francisco, California
Thomas Rice, Poulsbo, Washington
Mr. and Mrs. Barry Roth, Monterey, California
John Saxby, San Francisco, California
Methyl Shearer, Seattle, Washington
Ann Smiley, Ridgefield, Washington
Winifred Smiley, Ridgefield, Washington
Allyn G. Smith, San Francisco, California
Mr. and Mrs. V. D. P. Spicer, Centralia, Washington
William Stickle, Vermillion, South Dakota
Mr. and Mrs. Everett C. Stiles, Bellingham, Washington
Dr. Rudolf Stohler, Berkeley, California
Robert R. Talmadge, Willow Creek, California
Dr. Dwight W. Taylor, Menlo Park, California
Nell A. Unger, Zenith, Washington
Mr. and Mrs. Gerald Ward, Edmonds, Washington
Myrtle Warneke, Seattle, Washington
Virginia Waters, Seattle, Washington
Alta Wheeler, Seattle, Washington
Matie Wiard, Berkeley, California
Evelyn C. Wilson, Oakland, California
Emmeline Wingard, Gig Harbor, Washington



AMERICAN MALACOLOGICAL UNION, PACIFIC DIVISION
19th Annual Meeting

June 20-23, 1966

University of Washington



1. Elsie J. Marshall, 2. Dr. Alan J. Kohn, 3. Dr. Victor L. Loosanoff, 4. Col. Harvey L. Johnson, 5. Therese Anderson, 6. Mrs. Lee Hill, 7. Doug Larson, 8. Lee Hill, 9. Mrs. George Fischer, 10. Johanna Reinhart, 11. Lela Griffith, 12. V. D. P. Spicer, 13. Glee Patten, 14. Charles Bedford, 15. Grace Jones, 16. John Jarosek, 17. Dorothy Jarosek, 18. Margaret Livingston, 19. Marlene Avere, 20. Everett Stiles, 21. Mabel Stiles, 22. Twila Bratcher, 23. Ford Bratcher, 24. Lewis Livingston, 25. Ralph P. Jones, 26. Harold Dickey, 27. Barry Roth, 28. David Emerson, 29. Cedric Lindsay, 30. John Saxby, 31. Tom Rice, 32. Dr. Anne Hurst, 33. Daniel L. Luchtel, 34. Mary Larson, 35. Maurice Patten, 36. Amzel Spicer, 37. William Stickler, 38. Carol M. Lalli, 39. Jerry Landye, 40. Agnes Ward, 41. Dr. Dwight Taylor, 42. Dr. Rudolf Stohler, 43. Gerald L. Ward, 44. Dr. Robert T. Paine, 45. Kay Gudnason, 46. Dr. Myra Keen, 47. Robert Talmadge, 48. Tamara Loosanoff, 49. Jean Cate, 50. Effie Forthun, 51. Crawford N. Cate, 52. Nancy Eliason, 53. Fred Berg, 54. Evelyn Wilson, 55. Phyllis Eliason, 56. Mrs. Fred Berg, 57. Peggy Shearer, 58. Winifred Smiley, 59. J. E. Coley, 60. Estella Mulvania, 61. James McLean, 62. Rita Cunningham, 63. Ann Smiley, 64. Walter J. Eyerdam, 65. Harriet Doheny, 66. Mae Dean Richart, 67. Pat Johnson, 68. Gladys Archard, 69. Clarice Lynn, 70. Mary Hoyt, 71. Joan Demond, 72. Allyn G. Smith, 73. Jeanne Charlton, 74. Barbara Good, 75. Dr. Arthur W. Martin, 76. Nancy Brown, 77. Dorna Coley, 78. Elizabeth Howe, 79. Dr. C. Keith Goddard, 80. Dr. Frederick Duerr.

NOTES, NEWS, NOTICES

The American Malacological Union will hold the thirty-third annual meeting at Ottawa, Canada, July 31–August 4, 1967. Those attending will be guests of the National Museum of Canada, of Carleton University (providing housing and meeting room for some of the sessions) and of Dr. Arthur H. Clarke, Jr., who has assumed responsibility for making all arrangements. Details will be furnished all members in April.

* * *

The Pacific Division, American Malacological Union will convene in 1967 at Asilomar, Pacific Grove, California, June 28th to July 1st. All members of that group will receive meeting notices; others wishing to attend should request information from Mrs. G. A. Hanselman, 5818 Tulane Street, San Diego, California 92122. Send 50¢, please.

* * *

FREE SHELLS FOR SCHOOLS! A collection of Florida sea shells will be sent to teachers for use in their classes in areas where they cannot obtain shells themselves. Shells for this purpose are collected and donated by our shell club members, and postage is paid by the club. Requests should be on school stationery and addressed to: ST. PETERSBURG SHELL CLUB, Education Committee, 6431 17th Place North, St. Petersburg, Florida 33710.

* * *

The Rochester Shell and Shore Club has been erroneously listed in **HOW TO COLLECT SHELLS** as the Rochester Surf and Shore Club. The error will be corrected in the next edition.

* * *

From Dr. G. Alan Solem:

During the recent 11th Pacific Science Congress in Tokyo, a dream of Dr. Tadashige Habe was realized by the formation of the *Pacific Malacological Union*. Open to all who are interested in malacology of the Pacific region, regardless of their residence or nationality, this organization expects to promote the study of Pacific Ocean mollusks through sponsoring coordinated meetings with the Pacific Science Congresses, publication of a newsletter relating malacological activities and other activities. Formed by over 50 malacologists representing Japan, United States of America, Australia, New Zealand, Great Britain, and China, the first President is Dr. Tadashige Habe, National Science Museum, Tokyo, and Vice-President is Dr. D. F. McMichael, Australian Museum, Sydney. Dr. Harald Rehder of the United States National Museum is a councilor of the new organization. Annual dues are \$2.00 and information can be obtained from Dr. Habe at the above address.

* * *

The North Carolina Shell Club really did go all out in entertaining the AMU at Chapel Hill; the sand decorating the plaid-embellished place cards for the banquet was not just any old shell-laden sand but fossil, from east of Crescent Beach, circa 15,000,000 years!

RUTH E. COATS, 1911-1966

Conchology suffered a severe loss in the passing of Miss Ruth E. Coats. She was born March 2, 1911 in Seattle, Washington, died October 19, 1966 in Carlsbad, California. Surviving are her mother, Mrs. Emma Coats of Carlsbad, and two brothers.

Ruth received both a Bachelor of Science and Master of Science degree from the University of Washington. She had a major in zoology and a minor in geology, which subject she taught for a number of years at Palomar College.

She was the first elected chairman of the Pacific Division, American Malacological Union, later served as secretary-treasurer for several years. In 1954 Miss Coats was president of the Conchological Club of Southern California. She conducted a shell study class at the Burch home; Mr. and Mrs. Crawford Cate were two of the members attending these classes.

The shell house at Carlsbad, California—some would call it a museum—reflected her originality. It was remarkable for artistic beauty and for its excellent library containing many rare volumes. Around 1950 she bought the famous Raymond collection and in 1954 purchased the superb second Belle Whitmore collection; these were added to her own large collection made over the years from personal collecting, purchase, and by exchange.

The shell collection and all books pertaining to them will go to the California Academy of Sciences in San Francisco, while the geological collection and its books will go to Palomar College, San Diego County, California.

John Q. Burch

* * *

IN MEMORIAM

Katherine M. Anderson

Edward P. Baker

Ruth E. Coats

James W. Donovan

Henry G. Frampton

T. R. A. Nielsen

Betty Powell

Eugene H. Schmeck

ACTIVITIES OF AMU MEMBER SHELL CLUBS

ASTRONAUT TRAIL SHELL CLUB, Eunice M. Strait, Corresponding Secretary: Organized in 1966, we now have membership of 51 and growing. We meet at 7:30 P.M. on the second Wednesday of each month in Eau Gallie Women's Club building. We try to make a field trip on the third Sunday of each month; to date our highlight has been a trip in July to Sanibel Island. Our President is Mary Lane.

BOSTON MALACOLOGICAL CLUB: We have had a good year. Eight monthly meetings were well attended by members and their guests. Fourteen new members were welcomed aboard. We now have a total of ninety-eight members.

Programs for the past year were: "Coquina Donax" by Dr. Barry Wade; "Underwater Adventures from Maine to Puerto Rico" by Dr. Kenneth R. Read; "Coral Wonderland," a colored film from the Australian Information Bureau; "Collecting in Polynesia" by Miss Vida C. Kenk; "Studies in Marine Ecology in Antarctica" by Mr. John Dearborn; "Shellfish Studies in Chesapeake Bay" by Dr. Robert Hillman; "Studies on the Mussel" by Miss Vida C. Kenk; slides in color of Massachusetts shore mollusks by Mr. Armand Roberge.

In June our "field trip" took us to the homes of Mrs. Virginia Morton and Mrs. Rebecca Ritchie at Marblehead, Massachusetts to view their collection.

Officers for the 1966-67 season are: President, Dr. Kenneth R. Read; Vice-President, Mr. Henry Cutler; Secretary-Treasurer, Mrs. Barbara S. Crowley. Executive Committee: Dr. William J. Clench, Mrs. Bette Rachlin. Conchological Recorder, Dr. Kenneth Boss. Meetings are held at the Museum of Comparative Zoology in Cambridge, Massachusetts at 8:00 P.M. on the first Tuesday of each month, October through May. Visitors are always welcome.

BRAZORIA COUNTY SHELL CLUB, Joseph S. D'Amico, President: Our club, now in its third year, meets in the Plantation Room of the First National Bank of Lake Jackson, Texas, at 7:00 P.M. on the third Tuesday of each month from September to May.

Last year's activities:

Basic studies in Mollusks covered the terminology of the various parts of Pelecypoda and Gastropoda and the features which help to identify and classify shells.

Talks were given by Joseph S. D'Amico on the following families: Littorinidae, Fissurellidae, Lepetidae, Janthinidae. The talks were followed by round-table discussions.

Underwater pictures of marine life were presented by Mr. J. L. Boyett, Mrs. B. Martin and E. L. Libby. The public was invited to these showings.

A Junior Section of the Club was organized under the very efficient guidance of Kathryn Kirby.

Both sections of the club took part in the Brazoria County Fair, exhibiting many fine collections which were hailed by the visitors as an outstanding contribution. The exhibits were judged by Dr. Thomas E. Pulley, Director

of the Houston Museum of Natural History, Mrs. Thomas Kister, Member of the Conchological Group of Houston Outdoor Nature Club, and Mrs. T. E. Mills of Clute. The coveted Philadelphia Academy Award was bestowed on Mildred Tate for her beautiful exhibit of albino specimens and Ronald Livingston won the "Junior's Trophy" for his Worldwide entry.

Club members are active in two major projects: One in conjunction with the Houston Museum of Natural History and the Galveston Branch of the Bureau of Commercial Fisheries in the classification of the Gulf of Mexico mollusks; the other is the establishment of a Marine Life Department at the Brazosport Youth Museum in Lake Jackson.

Dr. R. Tucker Abbott was elected to Honorary Life Membership in the club.

Amaea mitchelli was established as the emblem of the club.

Both sections of the club conducted field trips along the Texas Coast.

Current officers are: Joseph S. D'Amico, President; Mildred Tate, Vice-President, Program Chairman and Conchological Recorder; Prentis Rost, Treasurer; Anna Mitchell, Corresponding Secretary; Norma D'Amico, Recording Secretary; Kathryn Kirby, Historian and Manager of the Junior Section.

Officers elected for the 1966-1967 term are: Mrs. Prentis Rost, President; Mrs. Kathryn Kirby, Vice-President; Mrs. Mildred Tate, Corresponding Secretary; Mrs. Anna Mitchell, Recording Secretary; Mr. Berth Mitchell, Treasurer.

BROWARD SHELL CLUB, Therese Marsh, Corresponding Secretary: Our original meeting hall having been converted into stores, we were forced to seek a new home and have again found a permanent one located at the Atlantic Federal Savings and Loan Association Community Room, 1750 East Sunrise Boulevard, Fort Lauderdale, Florida. Our meetings are held the second Wednesday of every month at 8:00 P.M. and always open to visitors.

We had as guest speakers Mr. and Mrs. John Proetz of Boynton Beach who presented a program of slides entitled: "Galaxy of Collectors' Items from the Shell World." Dr. Don Moore of the Marine Lab, University of Miami, spoke on "The Collecting and Storing of Shells." William M. Stephens, Institute of Marine Science, University of Miami, showed slides on living sea shells. Among these were the first of a live Nautilus. Mr. Dimitri Rebikoff, President of Rebikoff Oceanic, Inc., presented a film entitled, "Sea Frontiers." Mr. Rebikoff is a renowned underwater photographer living in Fort Lauderdale. Neil Hepler, one of our own members, demonstrated "How to Clean Live Shells." We held an Open Forum on shelling areas for South Florida, with Earl Chesler as Moderator. Shell publications and the available reference books regarding the identification of shells and their habits were discussed by Earl Chesler. Terry Marsh discussed and demonstrated "The Systematic Cataloguing and Storing of a Shell Collection."

Our Annual Christmas Party was hosted by Jim and Mary Lou Ingalls at their home, with an exchange of shell gifts by everyone.

Our Second Shell Show was again well received by the general public. In addition to being fun, it was instructive and rewarding to our members. Our Judges were: Mr. William E. Old, Jr., Dept. of Mollusks, American Museum of Natural History, New York; Dr. Donald Moore, University of

Miami; William Seiler of the South Florida Shell Club. Mrs. Mildred Royce of Fort Lauderdale judged the Shell Craft.

A collection of Florida shells has been donated to Florida Atlantic University, Boca Raton, mainly through the efforts and work of Betty Stapleton. We hope to do more along this line in the near future.

A new feature added to our monthly meetings is a Shell Raffle, which helps our treasury and which everyone enjoys.

Our current officers are: President, Ruth Chesler; Vice-President, James McIntosh; Treasurer, Louise Clark; Recording Secretary, Arlene Saxer; Corresponding Secretary, Terry Marsh; Ambassador-At-Large, Flynn Ford; Publicity, Helene Branch; Program, Jim McIntosh and Earl Chesler; Shell Show, Mary Lou Ingalls; Hospitality, Kitty McIntosh; Review Editor, Terry Marsh; Shell Hunt, Bruce Burkhard and Carl Stoner, Jr.; Shell Raffle, Jim McIntosh.

CHICAGO SHELL CLUB, INC., Mrs. Alice Burke, Corresponding Secretary: In September 1966, the Chicago Shell Club celebrates its second birthday. The Club now enjoys a membership of approximately 100, including 10 junior members. Meetings are held at 2:00 P.M. on the second Sunday of each month, September through June, at the Field Museum of Natural History, Chicago.

Officers for 1966 are: Dr. John R. Lewis, President; Dr. Henry Wehringer, Vice-President; Mrs. Charlotte Lindar, Recording Secretary; Mrs. Alice Burke, Corresponding Secretary; Mrs. Martha Klinkey, Librarian; Mr. Raymond Blunt, Sr., Treasurer; Mr. Stanley J. Dvorak and Mr. Albert J. Lindar, Directors.

Programs for the 1965-66 season featured the following: Mr. Bill Barada, noted columnist for *Skin Diver* magazine, narrated his color films on SCUBA diving; Dr. Alan Solem, Curator of Lower Invertebrates at the Field Museum of Natural History, advised members on scientific approaches to the accumulation and recording of collecting data; on another program, Dr. Solem presented a slide talk on his recent collecting trip to Samoa, Fiji and New Zealand; another slide-illustrated presentation on Pacific collecting was made by Club Director Albert J. Lindar; an Encyclopaedia Britannica film-strip on Pelecypoda was narrated by Director Stanley J. Dvorak; Mr. Jay Wollin discussed "Fossils of the Middle West" and showed slides on collecting trips; Club President Dr. John R. Lewis spoke on "Mollusks in Medicine."

Full-length color films were also featured in the Club's program, including Jacques Yves Cousteau's "The Silent World," and Walt Disney's "Restless Sea."

At Christmas, the club sponsored a highly successful dinner party for members and guests, and conducted its first shell auction. The club's Second Annual Shell Fair, non-competitive, was staged during the entire month of March at Chicago's Field Museum of Natural History. Members Mr. and Mrs. Arthur Moulding held an open house for members at the June meeting, the club's last before the July-August vacation period.

In addition to the club's regular programs, reviews of the six classes of mollusks were initiated, and will continue for some time. In addition to lectures, participants are furnished with illustrated texts specifically prepared by the club for this special program.

COASTAL BEND SHELL CLUB, CORPUS CHRISTI, TEXAS, Mrs. J. Roy Taft, Corresponding Secretary: Highlight of our past year was the shell show held in March, 1966. There were over eighty exhibits and eight out-of-town exhibitors participated in our show. More than one thousand persons registered in our guest book.

A club member, Mrs. Douglas Johnstone, conducts a shell study group for children from grades four, five, and six; eighteen are enrolled and meetings are held at the Public Library. Field trips are most interesting occasions.

Many of our members speak on shells for various garden and study clubs. Our officers: President, Carl Young; Secretary (Corresponding), Mrs. J. Roy Taft; Secretary (Recording), Mrs. Marjorie Hudson; Treasurer, Mrs. Marjorie Hudson.

Meetings are held at the Corpus Christi Museum on the fourth Tuesday at 8:00 P.M.

CONCHOLOGICAL CLUB OF SOUTHERN CALIFORNIA, Martha Dippell, Secretary: It would be difficult to write a report on the activities of this club without noting in addition the excellent and often learned programs, the outstanding merit of two regular features, the exquisite shell displays (Forrest Rae, Chairman) and the presentation of recent publications by those maestros, John Burch and John Fitch.

John Burch recently gave a masterful address on "The Living Olive," and on the table before him, performing in a bowl of sea water, were live specimens of *Oliva incrassata* (Sowerby) and *Oliva spicata* (Roding). They had been rushed up the day before from Cholla Bay, Mexico.

Other fine meetings were the annual Christmas party, very gala, with cocktails, dinner, and speaker Lamar Boren, expert photographer, who told us how he came to make the first movie film of an orca (killer whale), and an evening with Ray Poorman who said, "The shells will do the talking," as indeed they did from his collection of beautiful slides showing specimens, interesting, rare or minute, the latter often tremendously magnified.

Twice our sponsor, Dr. James McLean (Curator, Department of Marine Zoology, Los Angeles County Museum of Natural History), who is undertaking a revision of the generic system of Acmaea, spoke on the subject, bringing appropriate lots for display.

We proudly report that several members, the Crawford Cates, Helen DuShane and Twila Bratcher, have published articles in *Veliger* (the quarterly publication of the California Malacozoological Society).

The club invested in twenty-five copies of the new "Glossary of 1001 Terms Used in Conchology," compiled by Winifred Arnold for *Veliger*.

Our current project is the revision and bringing up-to-date of all material relevant to the "Lost Operculum Club," with a view to its subsequent publication.

The club meets on the first Monday of every month, 7:30 P.M., in the lounge of the Los Angeles County Museum of Natural History. Our officers: President, Twila Bratcher; Vice-President, Robert Howley; Recording Secretary, Martha Dippell; Treasurer, Dr. James McLean.

CONCHOLOGICAL SECTION, BUFFALO SOCIETY OF NATURAL SCIENCES, Ellen Holdway, Secretary: Our 68th year of growth! For we do

keep growing; each year another ring on our malacological tree while time takes away devoted friends while bringing others as loyal. This is the story of our group that meets on the third Friday of each month in the Humboldt Room, Buffalo (New York) Museum of Science.

This year has seen the birth of our "Shell News," editor, Morley Bishop; it is proving to be a valuable carrier of news and information.

Our conchological monthly journal: in September, Alice Metz reported on New Brunswick, Eunice Potter on Dr. Clench's museum, Diana Wandyez on a trip to the World's Fair, Dr. Storr from the Bahamas where he observed a cowry, in situ, laying eggs! Gertrude Ruggles and Hilda Peters visited that shelling capital of the world, Sanibel Island, then the Keys and the Biminis. Eugene Musial toured the bookshops and found a prize, a copy of R. Arango's "Malacological Fauna of Cuba" which bore the bookplate of a former member of the Section.

October brought the annual banquet, then a postprandial underwater safari as Dr. John F. Storr guided us, via color movies, about the world of fishes. We learned to release the trigger of the trigger fish, to locate the valve that deflates the puffer, and of fishes so transparent that grains of sand were visible right through them!

November was marked by table-top deep-sea dredging, the dredgings supplied by Jim Moore from Florida; as was to be expected, some found treasure, others, dross.

No meeting in December, and in January the following officers were elected: President, Morley Bishop; Vice-President, Diana Wandyez; Treasurer, Louise Becker; Secretary, Ellen Holdway. The new officers lost no time in setting up a program for the coming year.

February was a three ring circus! Annette Vallone dissected an octopus, Dr. Paul E. Peters by using charts proved how easy it is to pronounce the tongue-twisting Latin names of the shells, then Eugene Musial talked of the fascinating character of the tragic but interesting early naturalist, Rafinesque.

March took us on a trip to the new aquarium at Niagara Falls and April was a repeat of February in that Mrs. N. Sharpe discussed file clams, Mr. and Mrs. Lester L. Greene described and demonstrated the various facets of shell art and Morley Bishop ended the evening by showing us how to build a dredge.

The coming year promises to be even better but it will have to go some to beat this one!

(Late note: our beloved president, Mr. Morley Bishop, died suddenly on July 10, leaving a wife and three children. He was 54. E. H.)

FORT MYERS (FLORIDA) SHELL CLUB, Bernice E. Lescalleet: We became affiliated with the American Malacological Union in May, 1966.

Our 1966 officers: President, Mrs. Bernice E. Lescalleet; Vice-President, Mr. Cliff Veith; Secretary, Mrs. Gladys Veith; Treasurer, Mrs. Eileen G. Handran.

GARDEN STATE SHELL CLUB, Grace G. Eddison, M.D., President: Meetings are held the third Sunday of every month, September through June at 2:30 P.M. in the Lecture Room, the Newark Museum, 43-49 Washington Street, Newark, New Jersey.

Vice-President, Nick Katsaras; Treasurer, Donald Diehl; Secretary, Mrs. Jane Zager; Editor, Grace G. Eddison, M.D.

The Garden State Shell Club has had a busy and fruitful third year. In January, we issued Volume I, Number 1 of "The Jersey Sheller." Between January and June, our membership has nearly tripled, and is now approximately 160. "The Jersey Sheller" is a 72-page semi-annual publication designed to fill a gap we feel is present in the current shell literature. It contains a wide variety of articles related in some way to mollusks. The club has established a file containing accurate records of all shells (marine, land, fresh-water and fossil), found in New Jersey. New species for New Jersey and range extensions are reported in "The Jersey Sheller." However, the material printed is not restricted to the eastern seaboard, but is world-wide. The articles may be simple or scientific. The aim of "The Jersey Sheller" is to hold the interest of a beginning shell collector, and to offer stimulating material to the advanced collector as well. Subscription information can be obtained from our Corresponding Secretary, Mrs. Jane Zager, 326 Union Ave., Irvington, New Jersey 07111.

Our programs have been given by members and have included reports of collecting trips to Bermuda, Brazil and South Africa; Cones of the World; the Florida *Liguus*; SCUBA; and Chiton classification. A part of each meeting has been devoted to shell identification and study. We have had three field trips: one marine, one fresh-water, and one fossil.

GREATER ST. LOUIS SHELL CLUB, Violet E. Herwick, Corresponding Secretary: Our group has been busy this past year. Meetings are usually held in members' homes the second Wednesday of each month except August; the host or hostess usually supplies papers or films on various mollusk families or species. The June (1965) meeting was a family picnic and field trip for freshwater mussels.

A rewarding project under the chairmanship of Mrs. Winton Barker and Mr. Al DuRoucher has been working with the audio-visual department of our City Board of Education. Study boxes of shells are sent to teachers requesting them, and our club supplies a gift shell for each pupil. The project was and will continue to be supported by donations from all club members and hope is that we will soon be able to offer the same service to our county schools.

Highlight of the year was our recent shell show, April 23 and 24. Dr. and Mrs. R. Tucker Abbott of Philadelphia, Dr. George Garoian of Southern Illinois University, and James Houser of our own Museum of Science and Natural History judged many beautiful and interesting exhibits. The coveted award of the Academy of Natural Sciences of Philadelphia was won by Mrs. Frieda Schilling, one of our newest club members, for her Beginner's Collection.

Officers elected for 1966-67 are: President, Mr. Robert Remmert; Vice-President and Treasurer, Mr. William Neuman; Historian, Mr. Al DuRoucher; Recording Secretary, Mrs. Nancy Remmert; Corresponding Secretary, Mrs. Violet E. Herwick.

THE HOUSTON CONCHOLOGY CLUB meets the fourth Wednesday of each month, at 7:30 P.M., August through May at the Houston Museum of Natural Science. Visitors are always welcome.

Officers for 1966-67 are: Chairman, Tom L. Kister; Vice-Chairman, Carolos Cardeza; Recording Secretary and Treasurer, Miss Flower Follett; Program Chairman, Dr. Wataru W. Sutow; Corresponding Secretary, Mrs. Jeane Dashiell (130 Hickory Ridge, Houston, Texas 77024); Editor, Dr. Helmer Odé and Professional Consultant, Dr. T. E. Pulley.

We conducted five field trips to the Texas beaches during the year. These trips included overnight shelling to the Port Aransas, St. Joseph Island and Ransom Island area; a trip to collect edible mollusks resulting in clam chowder, fried clams and cockles and stewed cockles; and productive shelling during minus tides.

The club published Vol. 2, 9 issues of "Texas Conchologist" containing notes concerning Texas shells and news of shells and shellers.

Under the guidance of Harold Geis many of our members are participating in a systematic sampling of the Texas Coast of the Gulf of Mexico and are well along on a check list of Texas Coast shells.

Active and corresponding members total 60. The monthly meetings alternated between workshops and programs. Included in 1965-66 was a program of dissecting clams by Paul McGee and a film of Sea Lab. No. 1.

The club participates in Junior Education and placed traveling and permanent collections in a number of Houston schools during the year.

In May, 1966, the club held the first shell exhibit in Houston. It was well received by the general public.

JACKSONVILLE SHELL CLUB, Grace L. Kapp, Secretary: This has been a year of readjustment; several of our hard working members moved away, a few have turned to fossil hunting and an entire new staff has taken over the publication duties for SHELL-O-GRAM. Severe storms of the past two years destroyed several good shelling areas, abetted by dredging and much building.

Jacksonville University has loaned us display space for our annual shell show to be held July 29-31; we have exhibited Florida shells in their library display case during May, afterwards they went to the Biology Department.

Meetings are held at 8:00 P.M. on the last Thursday of each month at the Arlington Savings and Loan—except July. President, Leroy Rogers; Secretary, Grace L. Kapp; Treasurer, Mace Stephens.

NAPLES (FLORIDA) SHELL CLUB, Lucille Messmer: Our club has had a successful year. We meet on the third Thursday of each month, October through May, and meetings for the coming year will be held in the Women's Club building on Park Avenue. Visitors are always welcome. Activities are the same as in previous years.

Newly elected officers are: President, Helen Horner; Vice-President, Helen Erday; Secretary, Jane Rogers; Corresponding Secretary, Judy Minier; Treasurer, J. Richey Horner.

NATIONAL CAPITAL SHELL CLUB OF WASHINGTON, D.C., Marjorie McPhillamey, Corresponding Secretary: This past year we have had many interesting speakers for our monthly meetings. Dr. Joseph Rosewater and Dr. Harald A. Rehder have given talks on gastropod biology and classification. Norman Meese shared his excellent slides of living mollusks. Our 1965-66 scholarship recipient, George A. Radwin, talked on criteria for identification of muricid gastropods. Eleanor Vallieres' talk on the Philippines included slides of their beautiful shells. A film of the cruise of the Coast and Geodetic Survey vessel, "Explorer," was shown. Mrs. Paul Zahl showed exceptional pictures of the Great Barrier Reef. Dr. Joseph Morrison gave an illustrated lecture on pulmonate snails. Col. and Mrs. Walter Carpenter shared many of their outstanding shells and told ways of building a collection.

During the year we have enjoyed several extra-curricular activities: a freshwater collecting trip to the Great Falls of the Potomac; a most successful shell auction, with credit to Capt. and Mrs. Carl Aslakson, Comdr. and Mrs. Wesley Thorsson, and Col. and Mrs. Walter Carpenter, the money to go into our scholarship fund which we have been able to increase for next year to \$250; our annual dinner for members and guests; open house Sunday at the homes of several members with particularly fine collections.

An excellent account of the history and activities of our club since its beginning in September 1960 was written by Bessie White.

Comdr. Wesley Thorsson, our good president this past year, is moving to Hawaii with his family. We will miss them.

New officers for 1966-67 are as follows: President, Mrs. Olive M. Lewis; Vice-President, Capt. Carl I. Aslakson; Recording Secretary, Mrs. Walter N. Carpenter; Corresponding Secretary, Norman S. Meese, Jr.; Treasurer, Mrs. Elsie L. Davison; Historian, Mrs. Bessie E. White.

NEW YORK SHELL CLUB, INC., Milton Werner, Recording Secretary: New York Shell Club meetings are held at the American Museum of Natural History, convening at 2:00 P.M. on the second Sunday of the month, September through June. Exception: The May, 1967 meeting will be held on the first Sunday of that month. As of June, 1966, the roster of the club listed 283 members, of which 206 hold full membership and 77 hold corresponding membership. Current officers are: President, George Raeihle; Vice-President, Mansfield Fuldner; Treasurer, Mathilde Weingartner; Recording Secretary, Milton Werner; Corresponding Secretary, Grace McDougall. Mr. Nick Katsaras is again serving as Historian.

All members receive the *New York Shell Club Notes*, a mimeographed paper averaging eight pages, which is published ten times a year. Under the editorial management of Dorothy Raeihle, Anthony D'Attilio and Karl Jacobson, it presents reviews of current literature, news items, studies of local and world-wide species and summaries of presentations made at meetings.

The program of a typical meeting offers a variety of features and appeals to a wide range of interests. There are customarily two formal presentations, of which one is usually scientific in its approach. Most presentations, both the scholarly and the collecting-lore type, are made by members. Guest speakers who have appeared in the past season were Dr. Robert Robertson, Asso-

ciate Curator of Mollusks at the Academy of Natural Sciences of Philadelphia, who presented an absorbing study, "The Biology of Pyramidellid Gastropods"; Dr. Joseph P. E. Morrison, Associate Curator of Mollusks at the United States National Museum, whose report on "Collecting in the West Indies" covered snails and their ecological stations from shallow water to the hill tops; Mr. and Mrs. George Kline of Madison, New Jersey, who described their expedition for the ANSP to rich and unspoiled areas of Costa Rica.

During the year the club formed its own library, the nucleus being a great variety of books and papers donated by members. Serving as Librarian is Mrs. Selma Feinberg. Another milestone was the club's first party, held in lieu of the regular April meeting to give the members full opportunity to become better acquainted. During the informal meeting which preceded the social hour, the Mabel Bender shell collection, which had been donated to the club, was auctioned along with the supply of shells contributed by other members; the color slide and color film presentations were instructive as well as entertaining. A buffet supper crowned the day's events.

Our annual field trip June 25th was again to Orient Beach State Park, at the northeastern tip of Long Island. It was both a shelling and social success in spite of unexpectedly cool weather.

NORTH CAROLINA SHELL CLUB, Hugh J. Porter, Secretary: The club in its ninth year of existence now has 252 junior, senior and honorary members. Its four meetings this past 1965-1966 season were held in Nags Head, N.C. (September); Raleigh, N.C. (December); Myrtle Beach, S.C. (March); and Atlantic Beach, N.C. (May). As usual, the three coastal meetings were weekend affairs and the inland meeting was a Saturday only series of meetings. Visitors are always assured of a welcome.

The Nags Head weekend was one of the most enjoyable and best attended. Highlight of it was a banquet (the club's first) in honor of Mr. Moncie Daniels, the North Carolina State Legislator who introduced and who did much of the work in enacting the bill to make the Scotch Bonnet, *Phalium granulatum* Born, the North Carolina State Shell. At the Atlantic Beach meeting the club attempted its first shell auction which turned out to be an unexpected success.

Main project for the year was that of preparing for the 1966 American Malacological Union convention which the club had volunteered to host through cooperation of the University of North Carolina at Chapel Hill, N.C. Other projects worked on during the year were the Lula Upchurch Memorial Collection at the State Museum of Natural History in Raleigh, N.C. and the publishing of the third annual club bulletin.

Programs during the year were varied. Dr. John Ferguson presented a discussion on the Olividae family and its systematic problems. Later he teamed up with the photography of Dr. Jack Upchurch and presented two programs on "Shells and their Structure." Mr. Richard (Dick) Petit talked to the club on "Recent Molluscan Literature." Mr. Bob Simpson, a Morehead City freelance photographer, talked to the club on "Conservation and the Cape Lookout National Seashore Park." Mr. Tom Myers, a graduate student in the Duke University Oceanographic Department, gave an extremely interesting paper on the "Pteropods and their Distribution off the North Carolina Coast."

One movie on the North Carolina fishing industry entitled "Big Fish—Little Fish" was shown.

No organized field trips were held but time was allotted during the coastal meetings for individual collecting. As usual, interest during the meetings was kept high by the bartering, trading, and exhibiting of shells and the occasional awarding of interesting door prizes.

The 1966 officers are: President, Mr. Paul Jennewein; Vice-President, Mr. W. Gillies Brown; Secretary, Mr. Hugh J. Porter; Treasurer, Mrs. Elizabeth Mathews; Historian, Mrs. Charlotte Johnson; and Executive Committee Member-at-Large, Mr. Harry Davis.

PACIFIC NORTHWEST SHELL CLUB, Gerald Ward, President: The members of the Pacific Northwest Shell Club Inc. have enjoyed a very active year. It started with minus tides collecting, picnics, then summer tours, all making for productive collecting and topped off with an exchange meeting and the annual auction.

Fall and winter meetings featured some excellent talks: Dr. Jens Knutson from Pacific Luthern University spoke on biological collecting on Eniwetok Island; Dr. Albert Sparks of the University of Washington College of Fisheries spoke on the pathology of mollusks; Mr. Ralph Jones showed films of his trip to Africa; Mr. Clyde Sayce of the Washington State Shellfish Laboratory told us of *Ostraea* and the oyster industry; Ruth Winchell demonstrated identification of limpets by the radula; Mrs. Dorothy Jarosek told of a trip through the United States and Canada and Tom Rice showed films and the shells he collected on a trip to the Gulf of California.

But the focal point has been the varied activity in preparing for the 1966 meeting of the AMU, Pacific Division. Much excitement has been generated among members as they work on various committees; it has been great fun and we appreciate the honor of being able to host this meeting. As the great day approaches it seems that all will be in readiness with everything under control but the weather, and for that all fingers are crossed.

A collection of Puget Sound shells is being given by our club to the Tacoma Aquarium; the shells will be on display in the near future.

Visitors to our area are encouraged to attend our meetings which are held at 2:00 P.M. on the third Sunday of each month, alternating between the Pacific Science Center in Seattle and the Tacoma Aquarium at Point Defiance Park.

Our 1966 officers: President, Gerald L. Ward; Vice-President, Ralph Jones; Recording Secretary, Glee Patton; Corresponding Secretary, Ann Smiley; Treasurer, Clarice Lynn.

PACIFIC SHELL CLUB, Martha Dippell, Secretary: Our programs have emphasized local shells. One of our best was a panel by six members speaking on where, when and how to collect in specific areas from Northern California south to San Diego.

As usual, members have ranged further into Mexico—San Felipe, Puerto-citas, Cholla Bay, Guaymas, Mazatlan—and two of us to the U.S. Virgin Islands and Jamaica.

Twila Bratcher's highly interesting and worthwhile project, Shell Braille, continues to develop. Shells, carefully selected for their significance to children who cannot see (varieties of shape, size, texture, etc.) packed into compartmented boxes, with names and brief notes in Braille, are distributed to students in schools for the blind. This material has even found its way to similar schools in Europe. The project has recently attracted the attention of Braille Institute workers elsewhere in the United States who have written for information.

New this year is a project guided by Dorothy Myhre, who with the most enthusiastic support of the teachers, is cooperating with Operation Head Start. Groups of not more than fifteen pre-school children are given shells (these could be beach worn or fragmented) chosen for their common appealing names—"bleeding tooth, ark, angel wing, slipper, cone, etc." Next day at Dorothy's house they view collections of marine fauna and shells and study structure; they are then asked if they can remember a shell by its name, and thus learn to distinguish between shells and to realize that each has its own name. Later they pick out specimens from piles on a long table to take home. At school shells are made into collages.

Our club meets on the Sunday before the first Monday from October through June, two to four o'clock in the lounge of the Los Angeles County Museum of Natural History. Our sponsor is Dr. James McLean, Curator of the Department of Marine Zoology. Our officers: President, Robert Howley; Vice-President, Jean Wilkins; Recording Secretary, Martha Dippell; Corresponding Secretary, Pearl Snyder; Treasurer, Isaac Cowgill. We contribute regularly to the News of the Association of Western Shell Clubs, Dorothy Myhre, Editor.

THE PHILADELPHIA SHELL CLUB, Mrs. Carol Hoffman, Corresponding Secretary: Meetings are held the second Thursday of each month, September through May, at 8 P.M. at the Academy of Natural Sciences, 19th and The Parkway, Philadelphia, Pennsylvania 19103. Visitors are always welcome.

Membership for our 11th season was 223. Officers elected for 1966-67: Honorary Life President, H. B. Baker; President, Ronald D. Lowden, Jr.; Secretary-Treasurer, Mrs. Carol Hoffman, 25 Lexington Avenue, Lansdale, Pa.; Recording Secretary, Miss Patricia D. Henkels; Historian, R. Tucker Abbott; Vice-President, Mrs. Ruth E. M. Ostheimer.

The speakers during the year were Mr. and Mrs. Norman Jensen, of the New York Shell Club, who showed their color-slide program "Pink Sand of Eleuthera"; Mr. and Mrs. George F. Kline, who presented an account of their expedition to Costa Rica; Mr. Sam Fuller, who spoke about collecting in Tanzania; and member Gilbert F. Quinby, who showed slides on "Over and Under the Bahamas."

The annual club shell show and May donation auction were successful. A club picnic, including steamed crabs, was held June 18 at Oxford, Maryland, where members were given a tour of the U.S. Fisheries Shellfish Laboratory.

PITTSBURGH SHELL CLUB, Mrs. June Snyder, Secretary: Our club celebrated its first anniversary in March, 1966 in grand style. Dr. R. T. Abbott, our guest speaker, showed a series of slides entitled "Curator's Choice"—shells which he would personally like to collect. To further augment the occasion, the first Pittsburgh Shell Club Bulletin was circulated. It is hoped that this will be an annual publication.

Meetings are held once a month from October through June and visitors are always welcome. We meet on a designated Saturday at 2 P.M. at the Mellon Bank, Fifth Avenue and Craig Street, Pittsburgh, Pa.

Not only were we fortunate to have Dr. Abbott as a speaker this year, but were also honored by a visit from the 1965-66 American Malacological Union President, Dr. Ralph Dexter of Kent State University, Ohio, who presented the paper "Victor Sterki as a Malacologist." Other programs included "Shelling at Chincoteague," Gladys McCallum; "Shell Collecting with Mask and Snorkel," Norman Franke; "A Visit to the Legendary Robinson Crusoe Island of Juan Fernandez," Dr. Sergio Carvajal; "The Liguus Tree Snail," Leon Pequignot of Akron, Ohio; and "Shelling in the West Indies," Louis Dietrich. Other features included a sale of shells donated by members; "collecting" from a bushel of dredgings from the Gulf of Mexico; and a field trip this spring to collect fossil shells in a quarry near Uniontown, Pa.

Plans are under way to set up a lending library in the fall. Books will be loaned or donated by members to be shared with others in the club. Later, it is hoped, books will be purchased for permanent placement in the library.

The membership increased from the thirteen charter members to fifty-two at the present time.

Current officers are: President, Mrs. Gladys McCallum; Vice-President, Mr. Norman Franke; Secretary of Records, Miss Sharon Snyder; Secretary of Correspondence, Mrs. June Snyder; Treasurer, Mrs. Esther Parodiz; Counselor, Dr. Juan J. Parodiz.

ROCHESTER SHELL AND SHORE CLUB, Secretary Marjorie Brennehan: Meets at Charlotte Branch of Rochester Public Library, 3615 Lake Avenue, Rochester, N.Y., 4th Wednesday of each month at 8:00 P.M., September through June. November and December meetings are combined into banquet held first Wednesday in December.

Dinner announced at 1965 banquet by Peter Plummer blowing conch horn.

Our constitution and by-laws adopted in May, start of our fiscal year.

Our June auction netted club over \$100.00. Ned Brown, explained, "Building of Dredge," with mimeographed diagrams; sample dredge.

Programs Enjoyed: Fred Amos, paleontologist with Ward's Science Estb., conducted field trip to Hamilton Ridge, Bethany, N.Y. to collect Devonian fossils.

The Bishops, members of Conchological Section of Buffalo Museum of Science, showed slides, "Shelling in Maine and Sanibel, Fla."

Nora Osness, Shells in Art.

Bert Porreca's slides not only depicted shells but people doing shell bends.

At each meeting Berniece Plummer presents 15 minute classification of

shells, explaining conchological terms, illustrating this with shells of a genus such as *Voluta*, *Conus*, *Strombus*. Berniece brought several live specimens: *Strombus alatus*; *Euglandia rosea*; *Cepaea nemoralis*; *Otala lactea*.

Mrs. Charles Allen, using chalk board, instructs us in correct pronunciation of scientific names.

We are proud of member Jean Brown for fine work she did for Dr. Clench, by recording hatching of baby cones from egg case of *Conus floridanus*. They had been on display in aquarium in Sanibel Shell Fair.

We received good publicity from exhibit displayed in Rochester Gas & Electric window. Presented a challenge, for the window measured 7 by 11 ft.

We made 14 shell charts having Florida shells classified under both scientific and common names. Charts loaned, given to schools, libraries, scout troops.

New members receive folder containing club constitution, brochure, Shell Oil Company booklet, club emblem shells (*Viviparius contectoides* Binney); a list of books available in our circulating library.

Being an inland club, without a research conchologist or malacologist, our circulating library is very important.

Officers, 1966-67: President, Berniece Plummer; Vice-President, Elinor Abendroth; Secretary, Marjorie Brenneman; Treasurer, James Barton; Librarian, Doris Barton.

SACRAMENTO VALLEY CONCHOLOGICAL SOCIETY, Herbert W. Finke, Corresponding Secretary: We meet on the second Saturday of each month at 7:30 P.M. at the Junior Museum in Sacramento, California. Our officers:

President, William Pitt; Vice-President, James Pond; Corresponding Secretary, Herbert W. Finke; Recording Secretary, Mrs. William Pitt; Treasurer, Mrs. Bertha C. Finke.

Over the past year our club heard an illustrated lecture on oceanography, another on Florida shells and fossils, enjoyed a field trip and a picnic and viewed slides of shells in their natural habitat, and at other times of Hawaii, England, Scotland, Europe and the South Pacific.

ST. PETERSBURG SHELL CLUB, Marilyn S. Gordon, Corresponding Secretary: Our club held its meetings at the Florida Presbyterian College in St. Petersburg on the second and fourth Friday of each month, October through April; current officers:

President, Robert Lipe; Vice-President, J. Arch Mellor; Treasurer, William R. Reader; Recording Secretary, Dorothy Hansler; Corresponding Secretary, Marilyn S. Gordon; Librarian, Patricia Torrance; Directors at Large, V. Roger Dunn, Kitti Westfall.

Our '65-'66 program included "Around the World on Shell Stamps," John D'Aiuto; "Shells Just for Pretty," V. Roger Dunn; "The Restless Sea," a color-sound movie; "Biological Research in Estuaries," James E. Sykes; "Two Molluskateers," Barbara Steger; Christmas party and shell exchange; "Adventure Under the Indian Ocean," Dr. Sylvia Taylor; "Cones," V. Roger Dunn; "Shelling in the 10,000 Islands," Kitti and Bill Westfall; "Florida

Muricidae," Dan Steger; "Shelling with a Camera," Sally Kaicher; "Echoes of the Shell Show" (combined with election of officers), Dan Steger; a party for the members, hosted by the St. Petersburg Historical Society; annual picnic at Fort De Sota Park.

Nine field trips were held at six locations, all very well attended.

The 19th Annual Shell Show was held at Treasure Island Auditorium, March 23rd through March 27th, 1966; Judges were Dr. Sylvia Taylor, Dr. Joseph Rosewater, Dr. William Heard. Winner of the Smithsonian Institution Award was Dan Steger with his display of small marine shells of the Florida area. Mary and Flynn Ford won Shell of the Show Award with a beautiful specimen of *Murex beaulti*. Ribbons in thirteen other categories were also awarded.

SAN ANTONIO SHELL CLUB, Mrs. Louis N. Goethel, President: In our eleventh year we have four honorary, fifty-four active, thirteen junior, twenty-seven corresponding and seven institutional members. Meetings are on the fourth Monday evening at the Asbury Methodist Church, during July and December at members' homes and on special occasions elsewhere as was the case in February.

Then Dr. and Mrs. R. Tucker Abbott and Dr. and Mrs. T. E. Pulley were our dinner guests at a country club. Following dinner, members and guests went to Trinity University where Dr. Abbott presented a slide-lecture he entitled "Conchologist's Choice"—this open to the public.

Emphasis has been on scientific lectures with guest speakers, while papers read by junior members on the shell of their choice has encouraged participation in club activities; these papers are later published in our quarterly, *Shell News*.

One of our members presented a paper at the 1965 AMU meeting in New York. An attractive yearbook was published, again incorporating "Collector's Code of Ethics," by permission of Northwest Pacific Shell Club. In July, 1965 our Club became a Founding Member of the Conservation Federation of Texas. Added to our library was a gift of Johnsonia, Volume 1. Four field trips have been made, and our shell study group meets on one Sunday of each month. Numerous pictures and write-ups of members have appeared in our local papers, radio and television; thus the public is being made aware of the educational value as well as the interest to be found in shells.

For the sixth year our club has exhibited shells at the annual Fort Sam Houston hobby show. Our members have won thirty ribbons at three shell shows, including club sweepstakes at the South Padre Island show. Two of our group were invited to act as judges for the Beaumont shell show.

Our officers: President, Mrs. Louis N. Goethel; Secretary, Miss Beth Blount; Treasurer, Mrs. Jean Bayne; Editor, Texas Shell News, Mrs. Laura Gilbert.

SAN DIEGO SHELL CLUB, Carole M. Hertz, Secretary: We have been fortunate to have fine speakers at our meetings this year. Among our most notable are Chief Ronald J. Sweig, who gave a fascinating talk on Sealab II, using many beautiful slides in illustration, and Lt. Jack Rallons of the

Underwater Photographers Assn., who showed many of the slides he had taken and told of his experiences photographing in the deep. At our October meeting, Dr. Rudolf Stohler, an honorary member of our club, will speak on identification of shells using Myra Keen's *Key to Marine Mollusca Genera of Western North America*.

Our Shell Club Auction and Potluck Supper, held at the home of Mrs. Pam Brown, was a huge success and great fun. Part of the proceeds from the auction was donated to *The Veliger Endowment Fund*.

We had two Olivella dives this year since our first was not too successful. Our September picnic and our Christmas party complete a full and active year.

A Jo Blake Memorial Library is being set up by our club in memory of our late friend and treasurer, Mrs. Josephine Blake.

Our club meets on the second Thursday of the month at the Museum of Natural History. Our present officers are: President, James B. Stockman; Vice-President, Dave Mulliner; Secretary, Carole M. Hertz; Treasurer, Nola Michel.

SANIBEL-CAPTIVA SHELL CLUB, Dorothy Stafford, Corresponding Secretary. Officers: President, Miss Edith Mugridge (Sanibel); First Vice-President, Mrs. J. C. (Bernice) McCaul (Captiva); Second Vice-President, Mrs. Mary Aleck (Sanibel); Recording Secretary, Mrs. H. K. (Dorothy) Jeremiassen (Captiva); Corresponding Secretary, Mrs. Dorothy Stafford (Sanibel); Treasurer, Mrs. Arthur (Frances) Swanson (Sanibel).

The club meets the third Monday of each month, November through April, alternately at the Captiva Civic Center and the Sanibel Community House. This year we were fortunate to have two bonus meetings: one by the George Raeihles of the New York Shell Club, showing slides of the various "beasties" they had collected and kept alive in their New York apartment. They had managed to raise them through several generations and had taken pictures at all stages. The other surprise program was slides of their West Australian Cypraea by Jean and Crawford Cate, of the California Malacozoological Society. They are making a special study of these shells and will be off to Australia for field work in September. The experiment of having our two judges for the Shell Fair explain the whys and hows of judging brought out a good crowd, with many questions asked and answered. Our regular meetings had such interesting titles as "Live Shells in Action," "Around the World on Shell Stamps," "A Little Fantasy," "Faint Heart Never Won Blue Ribbon," "A New Disease—Shellmania" and "The Voice of the Deep." Speakers included Mary and John D'Atuto, St. Petersburg Shell Club; Mr. and Mrs. John Proetz of Boynton Beach; and Dan Steger, also of St. Petersburg.

Our Live Exhibit is always one of the major attractions of the show. We keep a variety of sea creatures alive for weeks and even months so that visitors can view our live mollusks.

This year for the first time on record, the Philadelphia Academy of Natural Sciences Trophy stayed on the Islands. It was awarded to none other than our own Maude Meyer (formerly Maude Nickerson) for her fine educational exhibit of Pinnidae.

The judges for the Shell Fair, William Clench, from Harvard's Museum of Comparative Zoology, and Donald Moore, of the Institute of Marine Science at the University of Miami, congratulated us on the quality of our exhibits, which, they said, were as fine as any they had ever seen. Entries came from off-island places, such as Fort Myers Beach, Tampa, St. Louis, Cape Cod, California, Rochester and Ithaca. And the emphasis on Sanibel-Captiva self-collected shells produces a number of fine entries.

Our Conservation Booklet was reprinted and is in great demand, but before another printing, we hope to revise it. We prepared two conservation exhibits, each consisting of a poster and boxes of local shells—one for the Second Annual Florida Conservation Week held at the Civic Center in Fort Myers—the other for the Annual State Convention of Audubon Societies, at the Lehigh Acres Auditorium. The poster from this latter exhibit now hangs in the new Sanibel Chamber of Commerce building just off the causeway and is attracting a great deal of interest.

SOUTH FLORIDA SHELL CLUB, MIAMI, FLORIDA: New Florida Law: Live *Strombus gigas* (our Queen Conch) may only be taken from Florida waters when they are to be used as food.

Over the past year such interesting speakers as Dr. F. M. Bayer, Dr. Walter A. Stark II, Dr. Valentine Lyman Hardy together with field trips to Ellicott Key, Port Salerno and Marco Island combined to make it a very successful year. Publicity in local and out of town papers helped boost membership.

The 1966 shell show was proclaimed outstanding with 56 exhibits by 40 exhibitors. The award of the Philadelphia Academy of Natural Sciences was presented to Mr. William N. Seiler for his educational exhibit of *Conus regius* while another of our club members, Mrs. Neal Leeman won the same award at the Naples show for her arrangement of *Epitonium lamellosum*.

We have spent a busy year working with marine scientists and conservationists in fighting for our off-shore reefs in Biscayne Bay. We have gone on record for the use of only trestle-type causeways to span the Bay in the future.

Our second Annual Shell Bazaar (to which all Florida shell clubs are invited) where shells are bought, sold or bartered was a great success.

The following are our current officers: President, Mrs. H. Brown Sturgeon; Vice-President, John A. Baker; Corresponding Secretary, Mrs. Elizabeth Dupuis; Recording Secretary, Mrs. Herbert Lewis; Treasurer, Mrs. Gordon Anderson; Editor, Mrs. Neal Leeman; Historian, Mrs. Myrtle Thomas.

Meetings are held at the Museum of Science at 8:00 P.M. on the fourth Monday of each month (except December). Y'all come down to Florida and go shelling with us!

YUCAIPA (CALIFORNIA) SHELL CLUB, Mrs. Arylene Baylies, Secretary: Outstanding speakers for our club during 1965 were Miss Frances L. Cramer, Professor of Biology at East Los Angeles State College and President of the Conchological Club of Southern California; Mr. Helmut Meier, a well known artist who makes models of living mollusks from color photos

and drawings; Dr. Donald Shasky, traveler and shell collector who illustrates his talks with color slides; Mr. John Fitch, Research Director and Editor of Technical Publications for the California Department of Fish and Game; Dr. S. Stillman Berry, researcher and bibliographer; Mrs. Twila Bratcher, skin diver and world traveler.

Field trips included an August potluck picnic; then a beautiful Christmas party rounded out our program for the year. Three couples from the club spent from four to six months in Mexico, collecting shells, interesting experiences and beautiful pictures which they share freely with their fellow members.

We meet on the first Sunday of each month, 2:00 P.M. at the Mousley Museum, 35350 Panorama Drive, Yucaipa, California. Our officers:

President, Mrs. Gertrude Wahrenbrock; Secretary, Mrs. Arylene Baylies; Treasurer, Mr. Howard Fletcher; Program Chairman, Kate St. Jean.

Also affiliated with the American Malacological Union are the Connecticut Shell Club, Connecticut Valley Shell Club, Gulf Coast Shell Club, Hawaiian Malacological Society, Long Beach Shell Club, Northern California Malacozoological Society, Palm Beach County Shell Club, Santa Barbara Malacological Society, Shell Club of the Ryukyu Islands.

A printed list of world shell clubs may be obtained from the AMU secretary—send self-addressed stamped envelope.

ACTIVE MEMBERS

Membership List Revised November 30, 1966

* Pacific Division member

- Abbott, Dr. and Mrs. R. Tucker, Dept. of Mollusks, The Academy of Natural Sciences of Philadelphia, 19th and The Parkway, Philadelphia, Penn. 19103.
- *Abel, Richard and Co., P.O. Box 5357, Portland, Ore. 97206.
- Adams, Lawson, 2100 S. Bay St., Milwaukee, Wisc. 53207. (Amateur.)
- Aguayo, Dr. Carlos G., College of Agriculture, Mayaguez, Puerto Rico 00709.
- *Albert, Mrs. Ernest, U. S. Army Eng., G. P. Bldg. & Grnds., APO 331, San Francisco, Calif. 94101.
- Alexander, Robt. C., 423 Warwick Rd., Wynnewood, Penn. 19096.
- Allen, Mrs. Calvin R., 2677 Arden Rd. N.W., Atlanta, Ga. 30305
- Allen, Dr. J. Frances, 6000 42nd Ave., #311, Hyattsville, Md. 20781
- Allen, Miss Letha S., 187 Argyle St., Yarmouth, Nova Scotia, Canada. (Mollusks in general.)
- *Allison, Dr. Edwin C., 1420 Henry St., Berkeley, Calif. 94709. (Fossil, Recent & mega-micro marine invertebrates.)
- Anders, Kirk W., Shells of the Seas, Inc., P.O. Box 68, Kissimmee, Fla. 32741 (Volutidae; all rare shells.)
- Anderson, C. J., 648 Keller Rd., Berwyn, Penn. 19312
- *Archerd, Mrs. Russell, 1133 Spruce St., Berkeley, Calif. 94703
- *Arnold, Ben E., Rt. 5, Box 27, Port Orchard, Wash. 98366. (Tropical and semi-tropical marines.)
- Aslakson, Capt. and Mrs. C., 5707 Wilson Lane, Bethesda, Md. 20034. (World marine shells.)
- Astronaut Trail Shell Club, c/o Eunice Strait, 330 Lagoon Ave., Melbourne, Fla. 32901.
- Athearn, Herbert D., Rt. 5, Box 376, Cleveland, Tenn. 37311. (Freshwater mollusks.)
- Athearn, Mrs. Roy C., 5105 N. Main St., Fall River, Mass. 02720. (Land shells.)
- Auerbach, Stuart, 1710 Algonquin Trail, Maitland, Fla.
- *Avery, Mrs. Rada Gail, 1823 N. 40th St., Phoenix, Ariz. 85008. (Shells of N. America; exch.)
- *Baily, Dr. Joshua L., P.O. Box 1891, La Jolla, Calif. 92038.
- Bain, Bonnie Alison, 137 Clair St., Mt. Clemens, Mich. 48043
- Baker, Mrs. A. W., Box 715, Valdese, N. C. 28690
- Baker, Emmett B., 7 Riverview Ave., Kingston, Mass. 02364. (General interest.)
- Baker, Dr. and Mrs. Horace B., 11 Cheltenham Rd., Havertown, Penn. 19083.
- Baker, John A., P.O. Box 171, Biscayne Annex, Miami, Fla. 33152. (General interest.)
- *Baker, Nelson W., 279 Sherwood Dr., Santa Barbara, Calif. 93105. (General interest.)
- Barlow, Alice Denison, 5 Downey Drive, Tenafly, N.J. 07670.
- *Barron, Stella, 322 Nordina St., Redlands, Calif. 92373.
- Bayer, Frederick M., Marine Lab., Univ. of Fla., 1 Rickenbacker Causeway, Miami, Fla. 33149.
- Beaven, Dr. and Mrs. J. Mahlon, 175 W. Ridgewood Ave., Ridgewood, N. J. 07450. (Amateurs; beautiful shells.)

- Becker, Mr. and Mrs. Albert F., 2157 Sunrise Dr., La Cross, Wisc. 54602. (Mississippi River shells.)
- Becker, Miss Louise W., 2 Lexington Ave., Buffalo, N. Y. 14222.
- Bedell, Adele Koto, 2643 Laundale Dr., Beloit, Wisc. 53511.
- Bedford, Charles A., Gen. Del., Roberts Creek, British Columbia, Canada.
- Beetle, Mrs. Dorothy, Peninsular Junior Nature Museum, J. Clyde Morris Blvd., Newport News, Va. 23601 (Land and freshwater world shells).
- *Behrens, Grace, Apt. 22, 360 West Chevy Chase Dr., Glendale, Calif. 91204 (Abalone and starfish)
- Bell, Lt. James H., 5227 Ridgedale Ave., Dallas, Texas 75206
- Bennett, Mr. and Mrs. C. G., 640 73rd St., Ocean, Marathon, Fla. 33050 (*Murex*)
- *Bequaert, Dr. Joseph C., Dept. of Entomology, Univ. of Ariz., Tucson, Ariz. 85717.
- Berg, Mrs. Frederick C., Box 28, Georgetown, Md. 21930 (Shells of Fla. Keys.)
- Bergeron, Eugene, P.O. Box 1236, Balboa, Canal Zone. (Biological survey of Panamic range fauna Mollusca.)
- Berry, Dr. and Mrs. Elmer G., 1336 Bird Rd., Ann Arbor, Mich. 48103.
- *Berry, Dr. S. Stillman, 1145 W. Highland Ave., Redlands, Calif. 92373.
- Bickel, David, Ohio State Museum, Columbus, Ohio 43200 (Systematics and ecology fw. mollusks, esp. pleurocerid snails)
- Bijur, Jerome M., 215 S. Fairfield Rd., Devon, Penn. 19333. (Florida marine shells; buy, exch.)
- Bippus, Alvin C., 2743 Sagamore Rd., Toledo, Ohio 43606. (Marine gastropods.)
- Blaine, Mr. and Mrs. Alger P., 74 Palmer Ave., Springfield, Mass. 01108. Winter: 237 19th Ave., S. St. Petersburg, Fla. 33705.
- Blanchard, Adrian G., 802 E. Main St., P.O. Box 713, New Port Richey, Fla. 33552. (All shells, Recent and fossil.)
- *Blankley, Wm. F., Scripps Institution of Oceanography, La Jolla, Calif. 92038. (Cephalopoda; synoptic collection of mollusks.)
- Blinn, Dr. Walter C., Dept. Nat. Sci., Michigan State Univ., E. Lansing, Mich. 48823. (Ecology, behavior of land snails.)
- *Boneff, Mr. and Mrs. R. J., 2217 S. E. Madison, Portland, Ore. 97214. (Indo-Pacific specimen shells.)
- *Bonus, Mrs. Warren, 26418 Marine View Dr., Kent, Wash. 98031 (All shells)
- Boss, Dr. Kenneth, Museum Comp. Zool., Cambridge, Mass. 02138
- Boston Malacological Club, Mollusk Dept., Museum Comparative Zoology, Cambridge, Mass. 02138.
- Bowen, The Rev. Norman, Hope, N. Dak. 58046 (General collector)
- Bradfield, Mrs. Jesse, 339 Mt. Alto, Rome, Ga. 30163. (General interest.)
- Bradley, J. Chester, 604 Highland Rd., Ithaca, N.Y. 14850.
- Bradley, John C., 469 Farmington Ave., Waterbury, Conn. 06710. (Travel and collect.)
- Branson, Branley A., P.O. Box 50, Eastern Ky. Univ., Richmond, Ky. 40475
- *Bratcher, Twila L., 8121 Mulholland Terr., Hollywood, Calif. 90046.
- Brazoria County Shell Club, c/o Mrs. R. C. Rost, Jr., Box 563, Brazoria, Texas 77422.
- Brooks, Mr. and Mrs. John C., 1112 Pine Ave., Ft. Pierce, Fla. 33450
- Broward Shell Club, c/o Mrs. T. Marsh, 1308 S.W. 9th St., Ft. Lauderdale, Fla. 33312
- *Brown, Dorothy, 2535 Loring St., Pacific Beach, San Diego, Calif. 92109. (Pectens.)
- Brown, Dr. and Mrs. Harvey E., 9455 S. W. 81st Ave., Miami, Fla. 33156.

- *Brown, Nancy L., 633 S.W. 136th St., Seattle, Wash. 98166 (Amphaneurea)
 Brown, Wade G., 1317 Arnette Ave., Durham, N. C. 27707
 Brown, Mrs. Ward, 1420 N. Lakeside Dr., Lake Worth, Fla. 33460.
 Broyles, Mr. and Mrs. Ralph E., 5701 Fairfield Dr., Ft. Wayne, Ind. 46807.
- *Brunson, Dr. Royal Bruce, Montana State Univ., Missoula, Mont. 59801
- *Bryan, Edwin H., Jr., Bishop Museum, Honolulu, Hawaii 96819. (Pacific biogeography and bibliography.)
- Buck, Mrs. John H., 499 Bair Rd., Berwyn, Penn. 19312. (Conidae.)
- Bullis, Harvey R., Jr., 101 Hague St., Pascagoula, Miss. 39567. (Western Atlantic, Caribbean, and Gulf of Mexico gastropods.)
- *Burbridge, Mrs. Harry, 2216 S. 212th, Seattle, Washington. 98100 (Classifying collection)
- Burch, Dr. John B., Museum of Zool., Univ. of Mich., Ann Arbor, Mich. 48104. (Land and freshwater mollusks.)
- **Burch, Mr. and Mrs. John Q., 1300 Mayfield Rd., Apt. 61-L, Seal Beach, Calif. 90740
- **Burch, Dr. and Mrs. Thos., 914 W. Palm Lane, Phoenix, Ariz. 85007. (Dredging.)
 Bureau of Commercial Fisheries, Biological Laboratory, Oxford, Md. 21654
- Burgers, Dr. and Mrs. J. M., 4622 Knox Rd., Apt. 7, College Park, Md. 20740.
- Burke, Alice A. and Thos. D., Jr., 1820 S. Austin Blvd., Cicero, Ill. 60650. (Marine mollusks of eastern U. S. A.)
- *Campbell, Dr. G. Bruce, 11221 Elm St., Lynwood, Calif. 90263
- *Campbell, R. W., 5536 Hardwick St., Burnaby 2, British Columbia, Canada. (Pacific Coast marine and terrestrial gastropods; exch.)
- Cardeza, Carlos M., 2309 Sunset Blvd., Houston, Texas 77005. (Amateur.)
- Carley, T. S., 407 Kingston, Deerfield, Ill. 60015.
- Carmichael, J. M., 7631 92 Ave., Edmonton, Alberta, Canada
- *Carney, W. Patrick, Dept. of Zool., Univ. of Montana, Missoula, Mont. 59801.
- Carr, Mrs. Jack C., 916 S. Fell, Normal, Ill. 61761 (*Cypraea*; *Murex*; collecting).
- Carriker, Dr. M. R., Marine Biological Lab., Woods Hole, Mass. 02543. (Shell demineralization; boring mechanisms of mollusks; marine ecology.)
- Casa Ybel Hotel and Beach Club, Sanibel Is., Fla. 33957.
- **Cate, Mr. and Mrs. Crawford N., 12719 San Vicente Blvd., Los Angeles, Calif. 90049. (*Mitra*, *Cypraea*; no exchanges.)
- **Chace, Mr. and Mrs. Emery P., 3446 Van Dyke Ave., San Diego, Calif. 92105.
- Chandler, Carl and Doris, P.O. Box 621, Rt. 28, Chatham, Mass. 02633. (*Conus*, *Cypraea*.)
- Chanley, Paul, Va. Inst. of Marine Sci., Wachapreague, Va. 23480
- Chatham Marine Shell Museum, Carl and Doris Chandler, Directors, P.O. Box 621, Rt. 28, Chatham, Mass. 02633.
- Chicago Shell Club, Chicago Natural History Museum, Chicago, Ill. 60605.
- Childs, Dinah M., 400 Maynard, Apt. 904, Ann Arbor, Mich. 48103 (Cytology of mollusks)
- Clark, Mrs. Dorla, Sun Circle Resort, Orange Beach, Ala. 36561.
- Clark, Wm. F., Mark D. and Robt. G., 504 Valley Rd., Terre Haute, Ind. 47803. (World shells.)
- Clarke, Dr. Arthur H., Jr., Dept. of Mollusks, Natl. Museum of Canada, Ottawa, Ontario, Canada.

Clarke, Dr. Rosemary, 2049 University Ave., Dubuque, Iowa 52002.
Clench, Dr. Wm. J., Museum of Comp. Zool., Cambridge, Mass. 02138.
Cleveland Museum of Nat. Hist., 10600 E. Blvd., Cleveland, Ohio 44106.

Cloidt, Chas. J., 74 Manhattan Ave., Avenel, N. J. 07001. (Shells of New Guinea and the Philippines.)

*Coan, Eugene, 891 San Jude Ave., Palo Alto, Calif. 94306.

Coastal Bend Shell Club, c/o Corpus Christi Museum, 1202 N. Water St., Corpus Christi, Texas 78401.

Cole, Wm. H., 288 Second St. S., Naples, Fla. 33940 (Fla. west coast sp.)

Coley, Mrs. Gene, 2221 Bayview Rd., Punta Gorda, Fla. 33950.

Compitello, Mrs. Juliette, 399 St. John's Place, Brooklyn, N. Y. 11238.

*Conchological Club of Southern Calif., Los Angeles County Museum, 900 Exposition Blvd., Los Angeles, Calif. 90007.

Conchological Section, Buffalo Society Natural Sciences, Buffalo Museum of Science, Humboldt Parkway, Buffalo, N. Y. 14211

Conchology Group of the Outdoor Nature Club, Houston, Texas, c/o Mrs. D. A. Dashiell, 130 Hickory Ridge, Houston, Texas 77024

Connecticut Shell Club, Peabody Museum, New Haven, Conn. 06501.

Connecticut Valley Shell Club, Springfield Museum of Nat. Hist., 236 State St., Springfield, Mass. 01103.

Cooper, Robt. W. and Marjorie, 5012 Pfeiffer Rd., Peoria, Ill. 61607. (Florida marine shells; world *Murex*, *Pecten*, *Spondylus*.)

Corbett, Wm. Phelps, 2939 Nelson St., Ft. Myers, Fla. 33901. (Exch. rare *Cypraea*, *Olivia*, *Murex*.)

Corgan, Jas. X., Box 7190, Tulsa, Okla. 74101. (Microscopic gastropods.)

Cornell University Library, Research Dept., Ithaca, N. Y. 14850.

Cornély, Guy, 53 Rue Jean-Jaures, Raizet Abymes, Pointe A. Pitre, Guadaloupe, W. I.

Costa, Alberto A. de, Cx. Postal 25, Petropolis R. J., Brazil

Cowles, Edw. F., Jr., 12 Hillcrest Ave., New Rochelle, N. Y. 10801. (Photography; tropical marine shells.)

Craig, Mrs. G. E. G., Apdo. Postal 448, Guaymas, Sonora, Mexico.

Craine, Ruth A., 63 West Main St., Norwich, N. Y. 13815.

*Cramer, Frances L., 967½ W. 30th St., Los Angeles, Calif. 90007.

Crocker, Mr. and Mrs. Arthur M., Laurel Hollow, Syosset, N. Y. 11791.

Crum, Mrs. Dan, 930 N.E. 23rd Pl., Pompano Beach, Fla. 33064 (*Conus*; *Voluta*)

Cull, Mr. and Mrs. Robert R., 7927 Chippewa Rd., Brecksville, Ohio 44141

Cummings, Raymond W., 121 Rugby Rd., Syracuse, N. Y. 13206. (Shells of West Indies, esp. Windward and Grenadine Is.)

Cutler, Henry H., 105 Abbott Rd., Wellesley Hills, Mass. 01570.

Cvancara, Dr. Alan Milton, Dept. Geology, U. of N. Dak., Grand Forks, N. Dak. (Recent freshwater mussels and Early Tertiary mollusks)

Cvancara, Victor, 12 Campus Court, Vermillion, S. Dak. 57069

Daigle, Mr. and Mrs. A. J., 219 Lana Dr., Lafayette, La. (*Murex*.)

D'Amico, Jos. S., 119 Persimmon Lane, Lake Jackson, Texas 77566.

- D'Attilio, Mr. and Mrs. Anthony, 444 East 82 St., New York, N. Y. 10028.
- Danforth, Miss Louise L., Box 415, Vineyard Haven, Mass. 02568.
- Davis, Mrs. Lawrence J., 20 W. 35th St., Wilmington, Del. 19802 (Amateur; all shells)
- Dawley, Dr. Charlotte, The Woman's College, Univ. of N. C., Greensboro, N. C. 27412.
- Deatrick, Paul A., 33 N. W. 33rd Ave., Miami, Fla. 33101. (*Strombus*, *Busycon*.)
- DeLuca, Mrs. John A., Miss Gladys, Deborah Rd., Hanover, Mass. 02339
- *Demond, Joan, Dept. Geology, Univ. of Calif., Los Angeles, Calif. 90024
- Desmond, Hon. Thos., 94 Broadway, Newburgh, N. Y. 12550
- Deuth, Dorothea J., Box 647, Fajardo, Puerto Rico 00648 (Puerto Rico mollusca; conservation of shoreline, etc.).
- Dexter, Dr. and Mrs. Ralph W., Dept. Biol. Sci., Kent State Univ., Kent, Ohio 44240
- Dickenson, Jas. R., M.D., 250 E. State St., Westport, Conn. 06880. (General interest.)
- Dietrich, Mr. and Mrs. Louis E., 310 Veri Ave., Pittsburgh, Penn. 15220.
- Dirr, Geo. L., 1726 Newbrook Dr., Cincinnati, Ohio 45231 (Freshwater clam glochidia)
- Dixon, Mrs. Ruth S., 711 Parker St., Durham, N. C. 27701. (Marine mollusks.)
- Doane, Bonnie M., 132 N. Pine, Apt. 1-A, Chicago, Ill. 60644 (Marine shells)
- Dodd, Wm. E., M.D. Ocean St. and Bay Ave., Beach Haven, N. J. 08008.
- *Donohue, Prof. Jerry, 7337 W. 88th Pl., Los Angeles, Calif. 90045. (Gastropoda.)
- Drey (Walter) Associates, 257 Fourth Ave., New York, N. Y. 10010.
- Duarte, Eliseo, Casilla Correro 1401, Central, Montevideo, Uruguay. (Exch. shells)
- Duerr, Dr. Frederick, 933 Valley View Dr., Vermillion, S. Dak. 57069. (and information.)
- Dunbar, Edwin C., Zool. Dept., Univ. of S. Dak., Vermillion, S. D. 57069. (*Goniobasis* sp.)
- Dundee, Dr. Dolores S., Dept. Biol., La. State Univ. in New Orleans, New Orleans, La. 70150. (Land mollusks; freshwater mussels.)
- Dunegan, Fr. Bertrand, O.S.B., James Barry-Robinson, 443 Kempville Rd., Norfolk, Va. 23502.
- Dunn, V. Roger, 5021 18th Ave., S., Gulfport, Fla. 33707. (*Conus*.)
- *Duren, Thos. J., 810 S. Robertson Blvd., Los Angeles, Calif. 90035
- *DuShane, Mrs. Jos., 15012 El Soneto Dr., Whittier, Calif. 90603.
- Dvorak, Stanley J., 3856 W. 26th St., Chicago, Ill. 60623. (Muricidae.)
- Eckardt, Mary Jean, 35 Prospect Park West, Brooklyn, N. Y. 11215
- Eddison, Grace G., M.D., 4740 Iselin Ave., Riverdale, N. Y. 10471. (World marine shells.)
- *Edmiston, Mrs. J. R., 14359 Addison St., Apt. 311, Sherman Oaks, Calif. 91403
- Eken, Elizabeth B., M.D., 83 Maple Ave., Morristown, N. J. 07960. (Cones.)
- Ellis, Dr. Derek V., Dept. Biol., Victoria Univ., Victoria, B. C., Canada.
- *Emerson, David N., Dept. Biol. Sci., Univ. of Alaska, College, Alaska 99735
- Emerson, Dr. William K., Museum of Nat. Hist., Central Park W. at 79th St., New York, N. Y. 10024.
- Emery, Adele K., Box 1265, South Miami, Fla. 33143. (Florida east coast shells.)
- Enders, Mr. and Mrs. Ernest M., 3 Ellen Dr., Farmington, Conn. 06032. (Specimen world shells.)

- Endres, Theo. F., 663 Pleasant St., Algonac, Mich. 48001. (Amateur.)
 Erickson, Carl W., 4 Windsor Ave., Auburn, Mass. 01501.
 Eubanks, Mrs. Edwin W., 3260 High Vista Dr., Dallas, Texas 75234
 Exum, Mrs. J. C., Jr., Snow Hill, North Carolina 28580
 *Eyerdam, Walter J., 7531 19th Ave., N. E., Seattle, Wash. 98115.
- Fackert, Dorothy C., R. D. 1, Box 355, Sussex, New Jersey 07461
 *Fancher, Madeline J., Box 144, Bridge Rt., Myrtle Point, Ore. 97458. (Amateur.)
 Farrell, Lyle H., Proctor Academy, Andover, N. H. 03216.
 Farris, Dr. Vera King, Museum Zool., U. of Mich., Ann Arbor, Mich. 48104
 Faulkimbury, R. P., 106 Pensacola Ave., Fairhope, Ala. 36532. (Small shells of north-west Florida and Alabama.)
 Ferguson, Dr. and Mrs. John H., School of Med., Univ. of N. Car., Chapel Hill, N. Car. 27515.
 Fetherston, Mr. and Mrs. Thos. C., 8 Nanticoke Rd., Cambridge, Md. 21613 (Self-collected American marine shells)
 Finlay, C. John, 16 N. Woodward Ave., Roselle, Wilmington, Del. 19805. (West Indian marine shells.)
 *Fitch, John E., State Fisheries Lab., Terminal Is., San Pedro, Calif. 90731.
 *Fletcher, Howard L., 1008 La Hermosa Dr., Redlands, Calif. 92373.
 Flipse, Robt. C., M.D., 1091 N. E. 88th St., Miami, Fla. 33138.
 Fohrenbach, Jack, 91 Elm St., Islip, L. I., N. Y. 11751. (Ecology of marine mollusks.)
 Ford, Mr. and Mrs. Flynn, 7 Glenn Creek Lane., St. Louis, Mo. 63124.
 *Forthun, Miss Effie, 507 Harvard E., Apt. 203, Seattle, Wash. 98102.
 Ft. Myers Shell Club, c/o Mrs. Lescalleet, Pres., 18 Becker Dr., N. Ft. Myers, Fla. 33903
 Foster, Mrs. Fred, 401 N. Justus St., P.O. Box 213, Oxford, Ind. 47971
 Fowler, Dorothy, 128 B Main St., Stoneham, Mass. 02180 (All shells)
 *Franchini, Irene, P.O. Box 41, Tranquillity, Calif. 93668.
 Franz, Dr. David R., Dept. Zool. and Entomology, U. of Conn., Storrs, Conn. 06268
 (Ecology and physiology marine mollusks, esp. Nudibranchs)
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 (West Atlantic shells.)
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- *Good, Mrs. Barbara J., 3142 Larga Court, San Diego, Calif. 92110.
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- Grabie, Mrs. A. J., Lot 22, 7803 46th Ave. N., St. Petersburg, Fla. 33700
- Graf, Jas. R., 3117 Grindon Ave., Baltimore, Md. 21214. (World shells.)
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- Graves, Howard B., Jr., 826 S. Ingraham, Lakeland, Fla. 33801. (*Conus*.)
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- Greenberg, Isidore, 1245 Eastern Pkwy., Brooklyn, N. Y. 11213. (Photograph and collect shells.)
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- Griffith, Mrs. Lela M., Egmont, British Columbia, Canada. (British Columbia marine shells, also *Conus* and *Cypraea*.)
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- *Gross, James B., Box 185, Douglas, Alaska 99824 (N.E. Pacific mollusca)
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- *Howard, Mrs. Faye B., 4167 Creciente Dr., Santa Barbara, Calif. 93105. (Gulf of California shells.)
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- **Loosanoff, Dr. and Mrs. Victor, 17 Los Cerros Dr., Greenbrae, Calif. 94904.
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- Lyons, Wm. G., Fla. Board of Conservation, Marine Lab., P.O. Drawer F, St. Petersburg, Fla. 33731 (Mollusks of Florida and Caribbean)
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- Malick, Donald, 5514 Plymouth Rd., Baltimore, Md. 21214. (Fossils—buy, sell, exch.)
- Malone, Elsie, Sanibel Island, Fla. 33957. (Buy, sell, exch. world shells.)

- Manes, Mrs. Sidney, Knollwood Rd., Fayetteville, N. Y. 13066 (*Haliotis*; also land and fw species)
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- *Marshall, Mrs. Thos. H., 2237 N. E. 175th St., Seattle, Wash. 98155. (World shells; exch.)
- Mattera, Albert and Mrs. Emily, 301 Dearborn Ave., Silver Spring, Md. 20901 (Pacific marines.)
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- McClary, Andrew, Dept. of Nat. Sci., Mich. State Univ., East Lansing, Mich. 48823. (Behavior of gastropods.)
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- *No. Calif. Malacozoological Club, Dept. Zool., Univ. of Calif., Berkeley, Calif. 94720.
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- Norton, Mr. and Mrs. LeRoy, Box 123, Presque Isle, Maine 04769 (Freshwater mollusks)
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- Novak, Mildred M., 3456 A Keokuk St., St. Louis, Mo. 63118. (*Murex*, *Voluta*, corals.)
- Oetzell, Miss Edith M., 518 S. Ardmore Ave., Villa Park, Ill. 60181 (*Conus*)
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Ostheimer, Ruth E. M., 146 S. Whitford Rd., Whitford (Exton P.O.), Penn. 19341.
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- *Pacific Shell Club, Museum of Sci. and History, Exposition Park, Los Angeles, Calif. 90007
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- Palmer, Dr. E. Laurence, 206 Oak Hill Rd., Ithaca, N. Y. 14850.
- Palmer, Dr. Katherine V. W., Paleontological Research Inst., 109 Dearborn Pl., Ithaca, N. Y. 14850.
- Parodiz, Dr. and Mrs. Juan J., Sect. of Invertebrates, Carnegie Museum, Pittsburgh, Penn. 15213. (Neotropical mollusks and freshwater gastropoda of U.S.A.)
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- Reader, Mr. and Mrs. Wm. R., 4772 49th Ave., N., St. Petersburg, Fla. 33714. (Live mollusks.)
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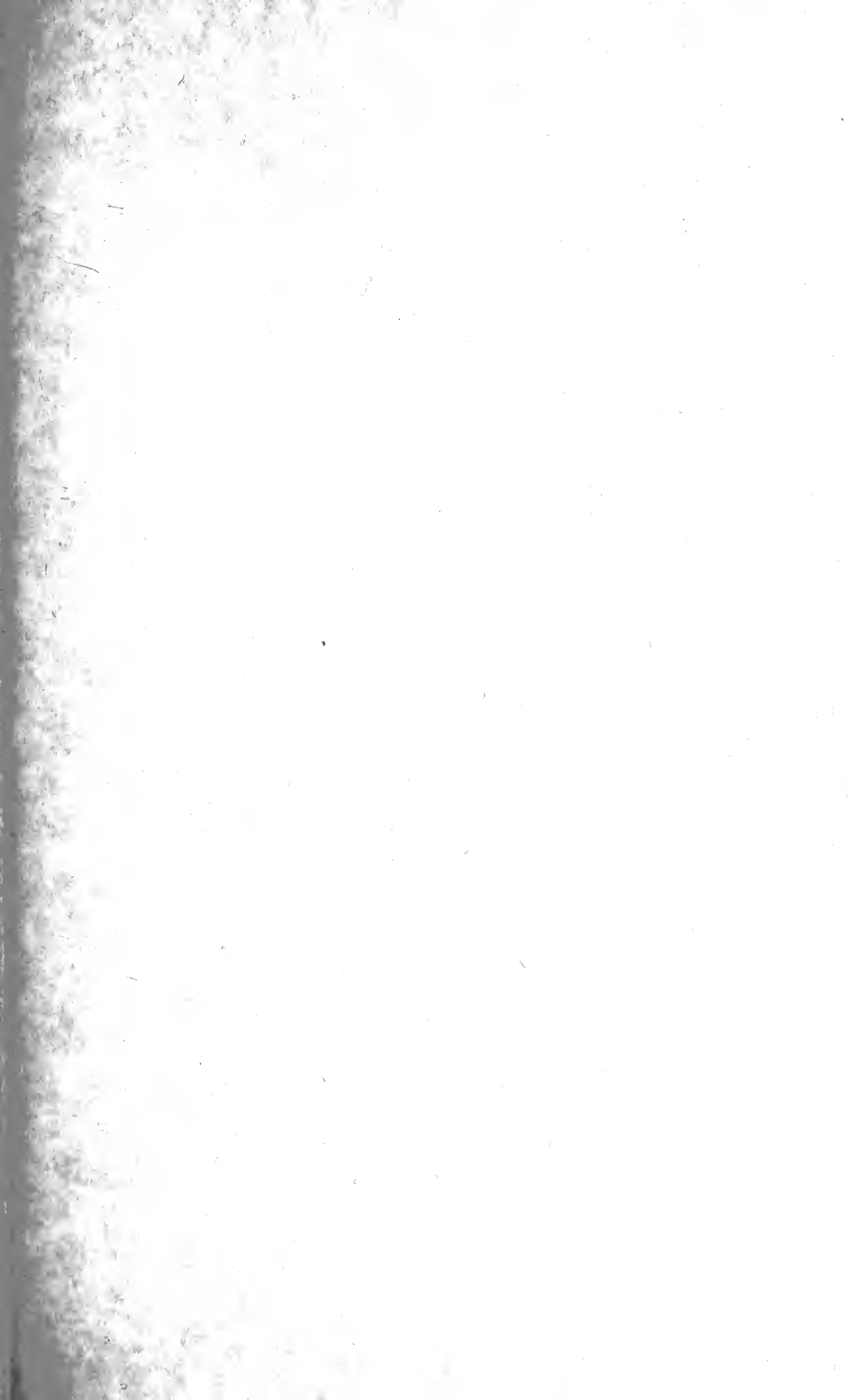
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92
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Mollusks

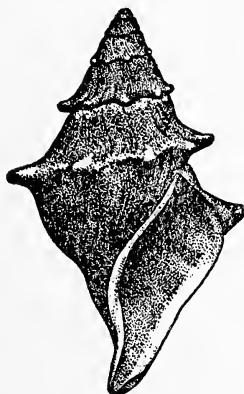
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AMU, Thirty-Third Annual Meeting
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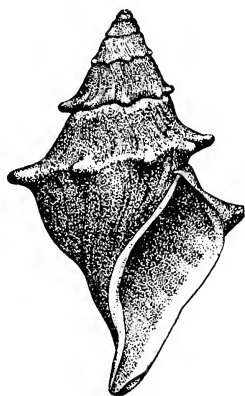
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Bulletin number 34, December 1, 1967. Issued Annually by the American Malacological Union, Inc. Editorial Board: Morris K. Jacobson, Editor, Margaret C. Teskey, Secretary. Office of Publication: Route 2, Box 318, Marinette, Wisconsin 54143.

Mailed, March 20, 1968

AMERICAN MALACOLOGICAL UNION THIRTY-THIRD ANNUAL MEETING

July 31–August 6, 1967

Ottawa, Ontario, Canada

On July 31, 1967 the American Malacological Union convened in Ottawa, Ontario, Canada. It was the 33rd annual meeting and a record number of members and their guests traveled north to enjoy the matchless hospitality of their Canadian colleagues. Although the membership of the AMU remains largely static, the number of persons attracted to these annual meetings increases from year to year, eloquent testimony to the pleasure which people who are in any degree interested in the science of malacology derive from the company of their fellows.

Comfortable housing, good meals and excellent rooms were provided by Carleton University but the real host was the National Museum of Canada whose staff, headed by Dr. Arthur H. Clarke, Jr., had planned and worked for many previous months to ensure a smooth-running meeting.

Registration began early on Monday, and at 2:00 P.M. the meeting was called to order by President Leo G. Hertlein who then introduced Mr. H. O. R. Hindley, Special Assistant to the Under Secretary of State, Government of Canada.

Mr. Hindley relayed the regrets of his two immediate superiors, unable to be present because of prior commitments. His own knowledge of the subject of malacology, said he, was in the main gastronomic but he assured his guests that the National Museum of Canada houses one of the major malacological collections of the Dominion and that the staff would be more than happy to arrange for viewing of any part of it by interested persons.

"I understand that later this week you are all going to visit Expo 67, of which we are all so proud. You'll like Montreal, the bi-lingual city. Did you know it is the second largest French speaking city in the world, and the largest English speaking city in Canada? Enjoy yourselves there, and while you're here in Ottawa, we want you to come again."

President Hertlein replied, thanking Mr. Hindley for the cordial welcome and reminding his listeners that this was the third occasion on which the AMU was meeting in Canada. He offered a brief survey of the study of malacology in Canada mentioning such names as Dawson, Whiteaves, Carpenter and especially LaRoque's indispensable catalogue (1953) of Canadian mollusks. He paid special homage to Canadian contributions to paleontology, especially notable in the country where the oldest (non-molluscan) fossils are found. He ended by offering the thanks of the entire membership to the Canadian Government authorities, the National Museum, and all others who had worked so hard to bring this meeting about.

Dr. Hertlein then introduced the first speaker, and the remainder of the afternoon was taken up by the following papers:

GROWTH AND LONGEVITY OF NAIADS FROM FISHERY BAY IN WESTERN LAKE ERIE, David H. Stansbery, Ohio State Museum and Ohio State University. (See page 10.)

SMALL BEGINNINGS, Adlai B. Wheel, Sr., Syracuse, New York.

"Captain" Wheel is no stranger to those who attend these meetings. Many of his boys are now men well into illustrious careers of their own, and their early mentor is proud that several are making their contribution to one or another branch of the natural sciences. Any surplus material that may interest a growing boy will be welcomed at the Boys' Club Museum of Syracuse, New York.

RECENT AND POST-PLIOCENE MOLLUSCA OF SABLE ISLAND, NOVA SCOTIA, Arthur H. Clarke, Jr., National Museum of Canada. (See page 11.)

HOSTS, SPERMATOPHYTES, AND THE SYSTEMATICS OF FIVE EAST AMERICAN ODOSTOMIA, s.l. (Pyramidellidae), Robert Robertson, Academy of Natural Sciences, Philadelphia. (See page 12.)

NOTES ON CAPTIVE *LEUCOZONIA NASSA* (Gmelin), *CHAETO-PLEURA APICULATA* (Say), AND *ISCHNOCHITON FLORIDANUS* Pilsbry, Dorothy Raeihle, Elmhurst, New York. (See page 13.)

At the close of this first day's sessions exodus back to Russell House afforded opportunities to view the beautiful 130 acre campus, bordered by picturesque Rideau Canal. Carleton is a fairly new (1942) College of Liberal Arts and its campus is unique in that beneath it subterranean passageways connect all of its buildings, surely a boon during Canada's winter months. Before the meeting was over many of the AMU visitors had descended into the tunnels to view the sometimes startling artistic achievements of anonymous students.

In the evening while the Executive Council met in annual session there was an informal assembly in one of the comfortable lounges. Newcomers were introduced, pictures of previous meetings were projected and those who had brought shells displayed them.

* * *

Tuesday morning ushered in a full day of papers:

LARVAL DEVELOPMENT IN THE CLASS BIVALVIA, Paul Chanley, Virginia Institute of Marine Science, Wachapreague, Virginia. (See page 14.)

SEASONAL REPRODUCTION IN THE LAMPSILINAE (PELECYPODA: UNIONIDAE), William H. Heard, Florida State University, Tallahassee, Florida. (See page 15.)

ON THE EVOLUTION OF *SPENGLERIA* (GASTROCHAENIDAE: BIVALVIA), Kenneth J. Boss, Museum of Comparative Zoology, Harvard University. (See page 15.)

DISTRIBUTION AND GROWTH RATES OF THE EDIBLE MUSSEL, *MYTILUS EDULIS* L., IN THE CANADIAN ARCTIC, Irene Lubinsky, University of Manitoba. (See page 17.)

A CORRELATION OF POSTGLACIAL MOLLUSCAN SUCCESSION AND RADIOCARBON-DATED POLLEN SEQUENCE FROM ATKINS LAKE, ONTARIO, Marcel Ouellet, University of Ottawa. (See page 18.)

DISTRIBUTION OF CANADIAN ARCTIC MARINE GASTROPODA, Mrs. Elizabeth Macpherson, National Museum of Canada. (See page 19.)

ZOOGEOGRAPHIC AND EVOLUTIONARY PATTERNS IN NORTHERN LYMNÆIDAE AND PLANORBIDAE, Arthur H. Clarke, Jr., National Museum of Canada. (See page 21.)

NOTES ON THE TAXONOMY AND ZOOGEOGRAPHY OF THE COLUMBELLIDAE, George E. Radwin, George Washington University and United States National Museum. (See page 22.)

NOTES ON SOME MOLLUSCA OFF THE COAST OF NORTH CAROLINA, Hugh J. Porter, Institute of Marine Sciences, University of North Carolina, Morehead City, N. C. and Charles E. Jenner, Department of Zoology, University of North Carolina, Chapel Hill, N. C. (See page 23.)

THE SAN JUAN EXPEDITION TO THE GULF OF TEHUANTEPEC, Donald R. Shasky, Redlands, California. (No abstract submitted.)

At this point Mr. M. Karl Jacobson asked for the floor, then explained briefly that he is considering compiling a polyglot dictionary of molluscan terms in German, Spanish, French, Russian and English. He is anxious to know if (1) a similar publication already exists and (2) if his colleagues consider such a compilation to be of substantial value. (Persons wishing to contact Mr. Jacobson on this matter should address letters to 455 Beach 139th Street, Rockaway Beach, New York 11694.)

This concluded Tuesday's sessions. Following dinner there was re-assembly in the now familiar auditorium, there to listen to a most entertaining and instructive lecture by Dr. Frederick A. Aldrich, Director of the Marine Sciences Research Laboratory of Memorial University, St. John's, Newfoundland. Developing his title *ARCHITEUTHIS*, THE GIANT SQUID, Dr. Aldrich gave a knowledgeable accounting of an animal that has fired the imagination of man since Jules Verne's science fiction of a century ago. (See page 24.)

As he closed his lecture eager listeners asked questions from all parts of the auditorium, then prolonged applause attested that Dr. Aldrich has the happy ability to deliver a fascinating lecture which is not only entertaining but also instructive.

* * *

Wednesday morning brought a break in routine as buses transported everyone several blocks to the National Museum. First a muster on the great staircase for a group photograph, then followed presentation of papers in the Museum auditorium.

DISSOCIATION AND REAGGREGATION OF MOLLUSCAN CELLS, Vera King Farris, Museum of Zoology, University of Michigan. (See page 25.)

THE FRESHWATER MOLLUSCA OF TAIWAN (FORMOSA), Henry van der Schalie and Gary Pace, Museum of Zoology, University of Michigan. (See page 26.)

ON THE EVOLUTION OF TORSION IN THE LIMIDAE (BIVALVIA), Thomas H. J. Gilmour, Department of Biology, University of Saskatchewan. (See page 27.)

A PROPOSAL TO REGISTER WITH THE AMU ANTIQUARIAN SHELL BOOKS, FOR THE PURPOSE OF CONSERVING AND TRACING THEM FOR FUTURE GENERATIONS OF SHELL ENTHUSIASTS, Mart Hulswit, New York Shell Club. (See page 28.)

The noontime break followed this paper and the audience was invited out onto the spacious lawn to find tables piled with box lunches. Nearly everyone elected to eat picnic fashion on the grass, then to employ the remainder of the two-hour break to tour the Museum with its variety of exhibits.

These papers were on the afternoon program:

MALACOLOGIA—FIVE YEARS OF PUBLICATION, John B. Burch and J. M. Huber, Museum of Zoology, University of Michigan. (See page 29.)

STUDIES ON SUCCINEIDAE, C. M. Patterson, Museum of Zoology, University of Michigan. (See page 31.)

THE DISTRIBUTION AND HABITATS OF *CARINIFEX* AND *PARAPHOLYX*, G. L. Pace, Museum of Zoology, University of Michigan. (See page 32.)

ENDODONTID LAND SNAILS OF RAPA ISLAND, PATTERNS AND PROBLEMS IN SPECIATION, Alan Solem, Field Museum of Natural History, Chicago. (See page 33.)

POLYEMBRYONY IN BULININE SNAILS, Chin-Tsong Lo, Museum and Department of Zoology, University of Michigan. (See page 34.)

A TAXONOMIC STUDY OF SOME SPECIES OF THE FRESHWATER SNAIL GENUS *SEMISULCOSPIRA* IN JAPAN (GASTROPODA, MESOGASTROPODA, PLEUROCERIDAE), John B. Burch and George M. Davis, Museum of Zoology, University of Michigan and the U.S. Army's 406th Medical Laboratory, Japan. (See page 36.)

At this point President Hertlein announced that the annual business meeting would occupy the remainder of the afternoon, declared the meeting open and called for the annual report of the AMU secretary.

AMERICAN MALACOLOGICAL UNION ANNUAL BUSINESS MEETING

April 30, 1966 marked the Anniversary of the founding of the American Malacological Union and completed 35 years of its existence. Today AMU members reside in 45 of the United States and in 18 foreign countries. At the close of the fiscal year (December 31, 1966) there were 760 members, classified as follows:

One Life President, 5 Honorary life members, 19 paid life members, 204 joint or family members (counted individually), 38 shell clubs (holding single membership), 22 corresponding members and 492 holding regular, single membership. 161, because of geographical location, are members of the Pacific Division.

Over the twelve month period 131 new members were enrolled, 97 lost: 83 for delinquent dues, 8 resigned, 6 were lost by death. Of late years the roster has been largely static, no effort having been made to promote membership

unless inquiry is received from those whose affiliation promises to be mutually beneficial.

700 copies of the Annual Report Bulletin for 1966 were printed, 657 copies mailed to members at a per copy cost of \$2.66. Editor Jacobson and your Secretary will welcome advice on the subject of curtailing or increasing the scope of this publication, since printing costs are certain to be increased for future issues.

The 1966 Treasurer's report shows net receipts for "How to Collect Shells" as \$234.95. In the subsequent six months \$269.15 (net) has been realized, largely in single copy sales. At the present rate of depletion, reprinting should be necessary early in 1968.

As with the previous AMU treasurers, a fine rapport exists between Mrs. H. B. Baker and the Secretary. No more capable person could have been chosen to fill the vacated office; it has been a pleasure to have worked with her and to have served the AMU over the past year.

Respectfully submitted,

Margaret C. Teskey, Secretary

AMERICAN MALACOLOGICAL UNION, INC.

It was moved, seconded and carried that this report be approved as read.

Treasurer Mrs. H. B. Baker gave an interim report of her office:

Rather than give simply a statistical report of the receipts and expenditures for the period since Jan. 1, 1967, your Treasurer thought it might be more useful for you to have general figures with an analysis of what they may mean to the AMU for the future. She herewith presents this for your perusal:

Total cash receipts—dues, sale of HTCS—\$2,326.41. Of this \$61.50 is advance dues, \$77.00 Life Memberships, and \$275.15 HTCS. Total payments are \$2,356.70. Of this total \$1,943.22 was paid to Allen Press for printing and mailing the 1966 Annual Report. The remainder was mainly postage for Secretary and Treasurer. The latter has on hand enough stamped envelopes for another year, so that should reduce postage costs considerably in 1968. \$400 was withdrawn from the savings account to pay Allen Press. The previous Treasurer had deposited \$1,200 in the account in January, 1967, just before the present Treasurer took office. The savings account has earned \$106.62 in interest.

Assets:	Brentwood Savings	\$4,146.65	
	Secretary's Fund	100.00	
	Treasurer's Fund	25.00	
	Girard Trust, checking account	835.23	
	TOTAL ASSETS		\$5,106.88
Liabilities:	Advanced Dues	\$ 61.50	
	Life Memberships	1,410.88	
	Due Sec. & Treas. Funds	35.00	
	TOTAL LIABILITIES		\$1,507.38
	Net Worth, July 15, 1967		3,599.50
			\$5,106.88

Because of the extraordinary and large donation from the North Carolina Shell Club, \$575.01, the AMU is in excellent financial condition at the mo-

ment. But please note that for this period total receipts were exceeded by the total payments by about \$30. Excluding advance dues and adding moneys due to the Petty Cash Fund, total payments were about \$125 more than receipts.

In view of the foregoing report, I believe that the AMU should take some action on raising dues for the future to avoid financial difficulties.

Respectfully submitted,

B. B. Baker, Treasurer

It was moved, seconded and carried that this report be approved as read.

The Secretary made a brief report of action taken by the AMU Executive Council at the July 31st meeting of that body. The Council had:

Heard and approved minutes of 1966 meeting;

Accepted the invitation of the Texas committee to hold the 1968 annual meeting in Corpus Christi, Texas;

Heard and tabled an invitation to hold the 1969 meeting at Key West, Florida;

Appointed a committee to study the financial condition of the AMU;

Bestowed honorary life membership on Secretary Margaret Teskey;

Drafted a resolution urging the Pacific Division to review and adjust the geographical boundaries of that body to include the Canadian northwest coast, and to discontinue the current assessment levied on service personnel with APO and Navy address in the Pacific, except for those whose permanent address is in PD territory;

Recommended appointment of a committee by the incoming president to compile a list of rare molluscan species endangered because of pollution, inundation or other causes;

Voted to continue affiliation with the AAAS;

Heard and gave unanimous endorsement to the slate of nominated officers for 1967-68;

Adjourned.

Nominating committee chairman Ruth D. Turner was asked for her report; on behalf of her fellow committee members van der Schalie and Robertson, she read the following slate of nominated officers:

President, Arthur H. Clarke, Jr.; Vice-President, Joseph Rosewater; 2nd Vice-President, (Chairman, AMU-PD) Fay Wolfson; Secretary, Margaret C. Teskey; Treasurer, Mrs. H. B. Baker; Publications Editor, Morris Karl Jacobson; Councillors-at-Large, Dorothy Beetle, Harold D. Murray, David H. Stansbery, Dan Steger.

A motion was made from the floor that nominations be closed and that the secretary be instructed to cast one vote for the slate as read. Seconded, carried.

Dr. Alan Solem rose to suggest that if enough interest was shown to warrant the effort, it may be possible to arrange for multiple airplane space or even a complete charter flight to attend the September, 1968 meeting of the European Malacological Congress in Vienna. It would, said he, make possible a considerable saving in fare. President Hertlein suggested that the incoming AMU president appoint a committee to investigate the matter.

There being no further business, the 1967 business meeting was declared closed.

Shell Club Night has come to be an institution of these annual meetings and quite rightly so. Forty-three shell clubs about the United States are now affiliated with the AMU and their importance is ever more apparent. Dr. Clench estimates that 50% of the shells making up the huge collection at the Museum of Comparative Zoology were collected by amateurs. Local shell clubs are largely groups of such amateurs, enjoying a common interest while serving a common cause.

The scope of a single club may be state wide (17 members of the North Carolina club from 9 cities were present) or several clubs may combine efforts to serve a single purpose (six Texas clubs will serve as host to the AMU in 1968). Four shell clubs on the Pacific coast publish a bi-monthly news report as a joint venture. The majority of those attending the current meeting belonged to at least one shell club, some to two or more.

And so it was to a crowded meeting room that Mr. Karl Jacobson as Master of Ceremonies called for order, then introduced Mr. Jim Wadsworth who gave his annual report on the misbehavior of his fellow delegates.

Judge Benj Lencher of the Pittsburgh Shell Club had composed a poem for the occasion. Mr. Al Lindnar of the Chicago Shell Club portrayed, via Kodachrome slides, a recent shell show organized by that group. On behalf of the Lower Keys Shell Club, Mr. Ashley Jeeter of Key West presented an eloquent invitation to the AMU to hold the 1969 meeting in that rapidly growing city. Myra Taylor and Anne Speers, representing the San Antonio and the Coastal Bend Shell Clubs respectively, appeared in full Texas regalia, repeating earlier promises of great things to come in Corpus Christi in 1968.

The remainder of the evening was taken up by representatives of the various clubs, rising in turn to report on the past year's activities. A drawing for several fine shells donated by Mr. Lindner brought Shell Club Night to a close.

* * *

Thursday morning was again fine and clear and papers began right on time:
ECOLOGY AND DISTRIBUTION OF THE MARINE SHELLLED MOLLUSCA OF BARBADOS, Vincent Conde, Redpath Museum, McGill University. (See page 38.)

ELECTROPHORETIC ANALYSIS OF ESTERASES IN *BULINUS*, John B. Burch and G. K. Lindsay, Museum and Department of Zoology, University of Michigan. (See page 39.)

COMMENSAL BIVALVES FROM THE NORTH CAROLINA COAST, Charles E. Jenner and Anne B. McCrary, Department of Zoology, University of North Carolina, Chapel Hill. (See page 40.)

THE DISTRIBUTION OF THE POSTERIOR PALLIAL NERVES IN *LAMPSILIS VENTRICOSA* (BARNES), Louise Russert Kraemer, Department of Zoology, University of Arkansas. (See page 42.)

POSTGLACIAL DISPERSAL PATTERNS OF LITTORAL MARINE MOLLUSKS AND CRUSTACEANS IN EASTERN CANADA, E. L. Bousfield, National Museum of Canada. (See page 42.)

CHANGES AND REDUCTIONS IN OUR FRESHWATER MOLLUSCAN POPULATIONS, Herbert D. Athearn, Museum of Fluvial Mollusks, Cleveland, Tennessee. (See page 44.)

LOCOMOTION IN *APORRHAI*S AND *HALIOTIS*, Alan Solem, Field Museum of Natural History, Chicago. (See page 45.)

STUDIES OF THE RADULAE OF TAIWAN MURICID GASTROPODS, Shi-Kuei Wu, Museum and Department of Zoology, University of Michigan. (See page 46.)

THE XYLOPHAGAINAE AND TEREDINIDAE, A STUDY IN CONTRASTS, Ruth D. Turner, Museum of Comparative Zoology, Harvard University. (See page 46.)

TREE SNAILS (*LIGUUS*) OF CUBA, HISPANIOLA AND FLORIDA, William J. Clench, Museum of Comparative Zoology, Harvard University. (See page 48.)

NOTES ON AMERICAN *HASTULA*, Joseph P. E. Morrison, United States National Museum, Washington, D.C. (See page 49.)

RECENT ADVANCES IN OYSTER CULTURE IN THE FAR EAST, Carl J. Sindermann, U.S. Bureau of Commercial Fisheries Biological Laboratory, Oxford, Maryland. (See page 52.)

JUVENILE GROWTH OF THE SEA SCALLOP, *PLACOPECTEN MAGELLANICUS*, Arthur S. Merrill and Julius A. Posgay, Fish and Wildlife Service Bureau of Commercial Fisheries Biological Laboratory, Oxford, Maryland and Woods Hole, Massachusetts. (See page 51.)

COLLECTING MEXICAN FRESHWATER MUSSELS, Joseph P. E. Morrison, United States National Museum, Washington, D.C. (See page 50.)

This paper completed the longest series of scientific sessions in the history of these annual meetings. That the program was neither rushed nor lagged was due to the fact that speakers observed their time limits, a practice not always followed in the past and one to be emulated in the future.

Light rain was falling as the final paper ended and many of the delegates made their way back to the dormitory via the unique foul-weather tunnels.

The skies had cleared by evening at which time the AMU was the guest of the Canadian government at the annual dinner held at one of Ottawa's finest dinner bars, the Riverside Hotel. Long tables filled the lavishly decorated dining room, and at each place were a number of favors—matches and luggage decals lauding Expo 67, small gold pins again in the Expo theme, and for each guest a boxed specimen of *Thracia conradi* Couthouy, a bivalve hitherto found in few private collections. (See Notes and News, page 84.)

The social hour brought relaxation from the cares of the day and the steak dinner which followed will be long remembered for its excellence.

Wine was served with the meal and at its conclusion the assemblage rose as President Hertlein said, "Ladies and Gentlemen, I give you—The Queen!"

A second toast was drunk to Canada, her maple leaf flag, and her National Museum, then President Hertlein voiced the gratitude of the AMU for the hospitality and kindness of the Museum and the people who had worked so long and tirelessly. He introduced those whose efforts had been outstanding: Dr. Taylor, Dr. Ed Bousfield, Mrs. A. H. Macpherson, Mrs. R. V. Smith, Mrs. J. H. Rick, Miss Maryl and Mrs. A. S. Weatherburn; finally the

hardest workers of them all, Dr. Arthur Clarke and his wife Louise. A standing ovation was made to this group, and on behalf of the North Carolina delegates who had so recently been through it all, Mr. Jim Wadsworth presented gifts to Dr. and Mrs. Clarke.

Several guests from other countries were present—Dr. and Mrs. Skihiko Inaba from China, Dr. M. A. Klappenbach from Uruguay and Dr. Shi-Kuei Wu from Thailand. The Donald Shasky family had come from California as had Dr. Hertlein, and there were seven guests from Florida.

Next, and in order of their date of service, the AMU Past Presidents were presented, beginning with Dr. Bill Clench whose term of office was 1935.

Another AMU Past President (1958) was the featured speaker of the evening: Dr. Aurèle LaRocque of Ohio State University but native of Ottawa, chose as his title *A HISTORY OF CANADIAN CONCHOLOGY*.

His topic was timely and interesting. While speaking of the early Canadian malachologists whose achievements have survived them, Dr. LaRocque closed with a tribute to the work of Reverend H. B. Herrington of Westbrook, Ontario. It is always heartening when one is appreciated before his name must be prefaced by "the late," and Reverend Herrington was present to reap the gratitude of his fellow malacologists for his important research and publication on the sphaeriidae.

The hour was growing late and the final feature of the evening was introduction and installation of the officers who will serve the AMU in 1968. In accepting the gavel from outgoing president Leo G. Hertlein, Dr. Arthur H. Clarke, Jr. invited his audience en masse to attend the 1968 meeting at Corpus Christi, Texas; he then declared the day's festivities to be ended.

But the end of the 1967 meeting was not yet; at 9:30 the following morning two buses transported about 80 collectors some 35 miles west of Ottawa to Fitzroy Harbour Provincial Park on the Ottawa River where land and freshwater mollusks were abundant.

Perfection may be wearing and the weather, ideal until now, turned capricious as a midday shower (downpour, rather) drove all but the most hardy back into the buses. While the rain pelted outside, box lunches were consumed, then as it subsided, back into the woods and river went the collectors. It was 4:30 before the return to the city was made, and the evening without scheduled activity was welcome.

Early Saturday morning two buses were again loaded for the anticipated visit to the Canadian Centennial at Montreal. Fabulous Expo 67 perhaps has been the most publicized event of its kind in world's fair history, so further description would be repetitious. Some idea of its size and scope may be gleaned from the fact that about 100 AMU visitors split into groups of twos and threes, and upon reassembly for the return trip learned that during the elapsed nine hours few had encountered any of their fellow delegates.

It was a fitting climax and those who attended the 1967 annual AMU meeting will always remember Expo 67 and Canada—long may she prosper!

Margaret C. Teskey, Secretary
AMERICAN MALACOLOGICAL UNION

**ABSTRACTS AND CONDENSED PAPERS
READ AT THE 1967 ANNUAL MEETING,
AMERICAN MALACOLOGICAL UNION**

X **GROWTH AND LONGEVITY OF NAIADS FROM FISHERY BAY
IN WESTERN LAKE ERIE**

DAVID H. STANSBERY
Ohio State Museum and Ohio State University
Columbus, Ohio

(ABSTRACT)

The pearly freshwater mussels or naiads of Lake Erie have long been noted for the distinctness and consistent periodicity of the growth lines laid down upon the periostracum of their shells. The stabilizing effect of this large mass of water insures relatively slow uniform temperature changes. This eliminates the primary cause of the numerous false annular rings found so commonly in stream naiads.

A total of nearly a thousand specimens of the three subfamilies of the Family Unionidae found in this area were used in this study. All twenty-seven species present were studied, using the annular ring method of Chamberlain (1931).

An examination of the resulting data and the growth curves drawn from them demonstrated that for *all* species:

1. Growth was most rapid during the first 2-5 years of age regardless of habitat.
2. Individuals living in deeper water having less current and finer sediments grew more slowly than the same species living in shallower water having more current and coarser sediments.
3. Growth rate decreased slowly and steadily after the first 1-3 years of life even though the individual may have lived to 40 years of age.

It was found that the three subfamilies of the Family Unionidae could be characterized as follows:

Ambleminae Morrison, 1955. (= Unioninae Ortmann, 1910, in part.)

Species of this subfamily usually have heavy sculptured shells, a complete hinge, are summer breeders and found more abundantly in the substrates of riffles or shoals (i.e. swift waters) of our streams.

These naiads are typically slow growing but live to be very old. All seven species of this group in this study commonly live to be over 20 years of age and several having over 40 annular rings were found.

Subfamily Anodontinae (Swainson, 1840) Ortmann, 1910.

Species of this subfamily are usually thin-shelled, lack shell sculpture, have incomplete hinge dentition or none, are winter breeders and are

the naiads most characteristic of fine sediments and quiet waters (i.e. our true ponds and lakes as well as the pooled portions of our streams).

These naiads are typically rapid growing, early maturing species having a relatively short life span. The extreme of this group in Lake Erie is apparently *Anodonta imbecillis* Say, which matures in its second year but rarely lives to be 5 years of age.

Subfamily Lampsilinae (von Ihering, 1901) Ortmann, 1910.

Species of this subfamily seem to be generally intermediate between the Unioninae and the Anodontinae. The shell is intermediate in weight, seldom sculptured and having a complete, if sometimes weak, hinge dentition. These species are typically winter breeders and, while at least some are found in all three stream habitat areas (riffle, run, and pool), they are most abundant in the firm, sand-gravel substrates of the runs.

These naiads are, as a group, intermediate in both growth rate and longevity although a few species could easily be grouped with one or the other subfamilies with respect to these characteristics. It is only in this subfamily, however, that sexual dimorphism is the rule in both shell form and growth rate. In length the males, with rare exception, grow faster after maturity than the females of the same species. It appears that what the males gain in length is gained by the females in width, and in weight there may be little if any difference. The age of maturity was found to be 3 years for all the species of this subfamily collected gravid from the shallow parts of Fishery Bay. Specimens of the same species from the deeper waters (30'-50') and finer sediments of western Lake Erie were not found to mature until 4, 5, or even 6 years of age though they might live much longer.

Because the growth rate is most rapid in juveniles, slower in mature adults, and slowest though persistent during senility, the reproductive life history of the individual is recorded in the annular rings upon the surface of the shell of most genera of the Lampsilinae.

RECENT AND POST-PLEISTOCENE MOLLUSCA FROM SABLE ISLAND, NOVA SCOTIA

ARTHUR H. CLARKE, JR.
National Museum of Canada

(SUMMARY)

The only published studies of the mollusca of Sable Island are by Willis (1857 and 1863; see H. Piers, 1889-90, Nova Scotia Inst. Nat. Sci., Proc. & Trans. 7 (4): 406-428). A surprisingly long list including forty-six species of marine mollusks was given but only one land species, "*Succinea* (?)," and no freshwater species were reported.

Between June 6 and 13, 1966, in company with three Ottawa scientists (H. F. Howden, W. R. M. Mason, and J. H. Rick), the writer visited Sable Island and made a sizable collection of living and post-Pleistocene fossil mollusks.

Nine species of land snails and slugs were found, mostly under boards or among the low, herbaceous flora of moist areas near the several freshwater ponds. All of these, except the *Oxyloma* species, are widespread in eastern Canada as native or introduced species. Specimens of the *Oxyloma* are now under study by Dr. Dorothea Franzen.

The land snails and slugs collected are listed below. (Abbreviations are: A, abundant; C, common; and R, rare.)

Oxyloma sp?—A
Cionella lubrica (Müller)—R
Discus cronkhitei Newcomb—C
Zonitoides arboreus (Say)—C
Arion subfuscus (Drap.)—R
A. circumscriptus Johnston—A
A. hortensis Ferussac—R
Deroceras laeve (Müller)—A
Cepaea hortensis (Müller)—A

Only one freshwater mollusk was seen, the ubiquitous pill clam *Pisidium casertanum* (Poli). This was collected only in Lily Pond near West Light where it was common.

Shells of marine mollusks were abundant on the beaches but live collecting was not possible on the open coast. Because of the frequent stormy weather and dangerous shoals no small boats are used at Sable Island. Twenty-three species of marine mollusks were found including shells of at least two warm-water species, the oyster *Crassostrea virginica* (Gmelin) and the bay scallop *Aequipecten irradians sablensis* Clarke. Samples (3 of oysters and 2 of scallops) were submitted for radiocarbon dating. The oysters all gave dates between 5650 ± 140 and 3540 ± 140 years B.P. (before present) and the bay scallops produced dates of 1800 ± 125 and 1432 ± 125 years B.P.

The ages determined imply that general northward migrations of oysters and perhaps of some other warm-water species, now living as disjunct populations in eastern Canada, may have occurred during the Hypsithermal Warm Period (about 6000 to 4000 years ago) but that bay scallops, at least, may have arrived during a subsequent, less favorable period, too late to reach Northumberland Strait or other presently suitable locations in Canada. From shell characters of the oysters and other data, it appears that Sable Island was much wider during the Hypsithermal and that portions of the Continental Shelf between the mainland and Sable Island may also have been above sea level during that period and later.

HOSTS, SPERMATOPHYTES, AND THE SYSTEMATICS OF FIVE EAST AMERICAN SPECIES OF *ODOSTOMIA*, S. L. (PYRAMIDELLIDAE)

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(ABSTRACT)

The notoriously chaotic systematics of the enormous family Pyramidellidae is based exclusively on shell characters. Studies of a few living pyramidellids

at Woods Hole and elsewhere reveal the pertinence and utility of other, easily observed species characters. These include: body colors (particularly the hypobranchial gland) and external morphology, host preferences, and (when present) spermatophore structure and function (T. Hoisaeter, 1965, Sarsia, 18: 63-68; R. Robertson, 1967 ["1966"], Year Book Amer. Philos. Soc., pp. 368-370). According to D. Maas (1964, Zool. Anzeiger, 173 (2): 137-148), various pyramidellid species also differ in penis structure and cuticularization. These animal characters should be particularly helpful in cases where shell characters are variable, convergent, or otherwise confusing.

NOTES ON CAPTIVE *LEUCOZONIA NASSA* GMELIN,
CHAETOPLEURA APICULATA SAY, AND
ISCHNOCHITON FLORIDANUS PILSBRY

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(SUMMARY)

Two specimens of *Leucozonia nassa* Gmelin, a 25 mm male and a 30 mm female, were collected in the Florida Keys in November, 1964. They have been kept in an aquarium of aerated sea water with coral sand along with an assortment of other small species that have included *Chaetopleura apiculata* Say and *Ischnochiton floridanus* Pilsbry. The following summer the *Leucozonia* mated, and on July 24, 1965 started the first of eight deposits of egg cases made intermittently over two seasons.

The cases were vase shaped, ivory-white, and rather parchment-like. The 7 mm overall height included the egg capsule of 6 mm which tapered to a 1 mm "stem" and an irregularly oval base which was attached to the substrate. Centered in the horizontally placed, 4+ mm oval top of the capsule was a thinner teardrop oval "hatch" of almost 2 mm. The eggs within were deep pink in color, very small, and very numerous. Few developed into embryos—perhaps only 5 or 6 juveniles would hatch from a single capsule.

A few observations were possible by viewing through the transparent "hatch": At 2 days movement of embryos; between 8 and 10 days both veligers and small pink eggs could be seen together within a capsule. The two-lobed veligers could be discerned on the 15th day; after this the cases, which gradually darkened to brown, were too opaque for observation.

One case, hatched prematurely between the 21st and 25th day, produced specimens in the veliconcha stage with the velar lobes so extended anteriorly and posteriorly that at first glance it appeared as four slender lobes.

Fully formed, crawling snails hatched after incubation periods ranging from 31 to 43 days. Their lumpy snail brown shells measured from 1 mm to 1½ mm both in height and width; the animal was pale pinkish, the eyes black.

Of several deposits, only a few specimens survived for observation: At 6 to 7 weeks they had grown to 3 mm and the animal was a very pale tan; at 5 months they measured up to 7 mm and the animal was a rich pink with tiny white flecks. It was not until they were about 9 months old and around 12 mm in height that the animals attained the brilliant red color of the adults.

Though hatched the same week (August 24–September 1, 1965) the four

specimens surviving to this date have not grown at the same rate: At 23 months they measure 17 mm, 18 mm (males) and 21 mm, 23 mm (females).

On July 27, 1967, the two young females started to deposit egg cases. They and the field-collected female (which now measures 37 mm) were grouped together, all three depositing egg cases in close proximity. The cases of the smaller females measured only $5 \pm$ mm in height and had comparatively fewer eggs, but the thin "hatch" area centered in the 3 mm top was full size—almost 2 mm.

The *Leucozonia* fed generally on live *Batillaria minima* Gmelin, but would also smother very small mussels (*Mytilus edulis* Linné) and scavenge the meat of opened mussels which had been placed in the tank as a general food for the various carnivores. Fine seaweeds were supplied for the herbivores. Empty mussel valves found tucked in under the bottom edges of stones were the first indication that *Ischnochiton floridanus* Pilsbry might not be entirely herbivorous. After some quiet watching the *Ischnochiton* was seen to emerge from the underside of a stone, clamp its anterior end on the mussel meat, then reverse its direction dragging the food back under the stone as far as possible. The observation was duplicated with another specimen of *I. floridanus* in another tank.

A second species generally herbivorous, *Chaetopleura apiculata* Say, was observed to feed on egg cases deposited on the walls of the aquarium. One specimen fed on the egg cases of *Prunum apicinum* Menke then present; currently other specimens have frequently fed on newly deposited and developing eggs of *Nassarius albus* Say and *N. obsoletus* Say. These did not appear to be "accidental" feedings while grazing, as the chitons would twist and turn to center in on the egg cases.

LARVAL DEVELOPMENT IN THE CLASS BIVALVIA

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(ABSTRACT)

Larval development has not been described in over 97% of extant bivalve species. Nevertheless, the diversity of larval types exhibited by the Bivalvia exceeds that of any other molluscan class and it is possible to make some hypotheses about the evolutionary history of bivalve larval development.

There are five known basic types of bivalve larvae: 1. Protobranch, 2. Pandoracean, 3. Veliger, 4. Glochidium, 5. Lasidium.

Protobranch larvae are oval and develop inside a ciliated epithelial test. Modifications of this test have evidently resulted in two evolutionary lines of development. In the Pandoracean-Veliger line the test has been modified to form a velum. In the Glochidium-Lasidium line it has been lost or reduced.

Pandoracean larvae resemble Protobranch larvae with a velum. Both types are lecithotrophic. The original shells of Veliger larvae are secreted by the shell gland. At this stage their development is probably homologous to that of Pandoracean larvae. Subsequent development is planktotrophic. Smaller egg size, longer pelagic period and development of an umbo are characteristic of the Veliger type of development.

Glochidia develop within the adult. At time of discharge they are characterized by relatively heavy shells that may be armed with spines. Further development is usually dependent on a parasitic stage with a fish or amphibian host. This parasitic stage may be optional or lacking in some species.

Lasidium larvae are highly modified fish parasites bearing little resemblance to other types of bivalve larvae. At the time of their discharge from the parent their most conspicuous feature is an extremely long thread or tentacle that is lost when the lasidium attaches to its host.

Two basic trends have influenced the evolution of bivalve larval development. The first appears to be an evolutionary tendency to increase dispersal of larvae. This has been accomplished in advanced types by lengthening the pelagic period (Veliger) or development of parasitic stages (Glochidium, Lasidium). A second evolutionary trend seems to be toward protection of larvae through internal or external incubation. Incubation may be for a few hours or up to the length of the entire larval period. External incubation can be in brood sacs or nests or in gelatinous egg strings or masses. Internal incubation occurs in brood pouches in the mantle cavity or gills. The influence of incubation on larval development has resulted in direct development or modification of the basic larval types to create several sub-types.

SEASONAL REPRODUCTION IN THE LAMPSILINAE (PELECYPODA: UNIONIDAE)¹

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(ABSTRACT)

Varying numbers of animals of *Lampsilis anodontoides* s.l., *L. claibornensis*, *L. subangulata*, *Villosa vibex*, and *Carunculina paula* were obtained at fairly regular intervals throughout a calendar year.

Histological studies of gonadal tissue provided information on the age at which gametogenesis begins and on seasonal aspects of the germinal cycles. Data on the number of ovisacs charged with glochidia were obtained and plotted against the season and against the age of the animal.

The information derived from these studies has enabled an examination of seasonal intraspecific, interspecific, and intergeneric variation in the reproduction of this group of freshwater mussels.

ON THE EVOLUTION OF *SPENGLERIA* (GASTROCHAENIDAE: BIVALVIA)

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(ABSTRACT)

The genus *Spengleria* of the bivalve family Gastrochaenidae was established

¹ This investigation was supported, in part, by research grant B5-2369 from the National Science Foundation.

by Tryon (1861) and, in the Recent fauna, consists of two species that are distributed in the two major tropical zones of the world, the Indo-Pacific and the western Atlantic. Living representatives are found only in these zones, although the fossil record indicates that the genus once had a more extensive distribution.

In the western Atlantic, *Spengleria rostrata* (Spengler 1793) ranges from Bermuda and off southeastern Florida to Brazil, with a main concentration in the Florida Keys. In the Indo-Pacific, *S. mytiloides* (Lamarck 1818) has been taken in the Red Sea and Persian Gulf, the Indian Ocean on the islands of Réunion, Mauritius, Bourbon and Madagascar, through the East Indies and the Philippine Islands to Queensland, Australia in the south and Japan in the north.

Spengleria differs from all other genera of the Gastrochaenidae in the presence of the strong radial sulcus which extends from the umbo to the postero-ventral junction. The posterior dorsal slope is demarcated by the sulcus and possesses variously developed subconcentric ridges. The strength and number of ridges, the outline of the posterior margin of the shell and the form of the anteroventral sinus serve to distinguish the Recent species. A dorsal alation is also set off posteriorly.

An indication of the phylogeny of *Spengleria* can be seen in the fossil record. The genus is known from the Eocene where it was already well differentiated from other gastrochaenids. In the Old World, where the genus does not presently occur, Deshayes (1860) described *S. spengleri* from Valmondois on the Oise River, an Eocene deposit in the Paris basin. *Spengleria* already reached the New World during the Paleogene with the species, *S. cimitariopsis* (Harris 1896) found in the Eocene Midway Formation of Georgia.

A number of European Neogene fossil species occur in the lineage of *Spengleria*. Cossmann and Peyrot (1909) described *S. neuvillei* from Le Peloua, France, in the Burdigalian of lower Miocene age. Mayer-Eymar (1864) introduced *S. cuvieri* from chalk deposits on the island of Baixo near Porto Santo in the Madeira Islands; this is an Helvetian species of middle Miocene age (Dollfuss and Dautzenberg, 1902). Sacco (1901) named *S. miotaurinensis* from the Torni hills of the Piedmont, Italy in Helvetian deposits. These European fossil species are the early Neogene ancestors of *Spengleria* which gave rise to the modern tropical species.

Spengleria presents a simple example which illustrates the phenomenon of a phylogenetic pattern imposed by the breakdown of the extensive Tethyan Sea. In closely related, warm-water Indo-Pacific-New World species-groups we often expect to find an ancestral form in the European-Mediterranean Region but rarely do we encounter such a clear cut, documentable fossil record to illustrate the evolution of the Recent forms.

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DISTRIBUTION AND GROWTH RATES OF *MYTILUS EDULIS* L. IN THE CANADIAN ARCTIC

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Mytilus edulis L., primarily a boreal species, becomes an important member of the marine shallow water animal communities in the Arctic. It penetrates northward with warm waters of mixed type and may settle in the warmed up layers of the polar water. Therefore in higher latitudes it becomes indicative of milder temperatures and of certain degrees of salinity. Its presence in the north is of importance in zoogeographic zonation and, in deposits, indicative of past marine climates. Its abundance and body size express the productivity of Arctic basins. *Mytilus* is also one of the food sources for native population.

Investigations of the Arctic Unit of the Fisheries Research Board of Canada have shown that the area of distribution of *Mytilus edulis* in Arctic North America is disrupted in the central Canadian Arctic. The mollusk occurs along the northern mainland, but is absent between Kent Peninsula and the Ponds Inlet region. In the Canadian Eastern Arctic the northern boundary of distribution is at Padloping Island, Baffin Land, and at the southern entrance to the Fox Channel. In the north *Mytilus* becomes smaller and less abundant. The decrease in size and weight is noticeable especially in the populations from southern Hudson Bay and James Bay in the eastern Canadian Arctic and in the Liverpool Bay and Husky Lakes region in the Western Canadian Arctic. The 9-11 year old specimens attain the length of 6-7 cm in Hudson Bay and only 3-5 cm in James Bay. The weight of shells decreases from 7.0 to 0.3 gms, and the weight-length index from 0.44 to 0.34 respectively. The shells become transparent and pliable and their color changes from black-blue to light horn-yellow. A similar phenomenon is observed in the Liverpool Bay and Husky Lakes. These changes, progressing gradually toward the south of James Bay and Husky Lakes, are expressions of clines in the populations of *Mytilus edulis*. The present studies have shown that decrease in size and weight is a result of depressed growth. The decline in *Mytilus* populations is caused primarily by the limited water exchange in these basins, leading to the accumulation of brackish waters and reducing the influx of nutritive materials.

A CORRELATION OF POSTGLACIAL MOLLUSCAN SUCCESSION AND RADIOCARBON-DATED POLLEN SEQUENCES FROM ATKINS LAKE, ONTARIO

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(ABSTRACT)

In this investigation, the biostratigraphical data from successive molluscan faunae and from corresponding pollen zones obtained from four Livingstone core samples have been correlated. The cores each measured four meters in length and were taken from the middle of Atkins Lake, a shallow mesotrophic body of water about one mile in diameter, resting on the Ordovician limestone and located about 40 miles NE of Kingston, Ontario (44°45' lat. N. and 75°51' long. W.), 381 feet above sea level.

One meter of gray silty clay covers the bedrock. This is overlain by one meter of light brown laminated marl which contains most of the mollusks, and grades sharply into a dark brown gyttja which extends to the top. The organic-inorganic contact 3.6 meters below the top of the core was radiocarbon dated as II, 100 ± 270 (GSC-762) years old.

One of these cores was sampled at every 10 cm for pollen analysis. Based on the pollen diagram, 19 arboreal pollen types and 21 non-arboreal types of pollen zones have been correlated with those established for the St. Lawrence lowlands. The three other cores were divided into samples of 15 cm intervals. All mollusks from each sample were identified and counted. From these data a molluscan diagram showing the biostratigraphic distribution in percent of each species and form was plotted. Of the 27 species and forms of mollusks identified, the most numerous were: *Valvata tricarinata tricarinata*, *V. tricarinata simplex*, *Gyraulus parvus*, *Amnicola lustrica*, *Amnicola limosa*, *Pisidium nitidum*, *P. ferrugineum*, *P. nitidum* form *pauperculum* and *P. nitidum* form *contortum*.

One of the most interesting features found is the succession of the forms of *Valvata tricarinata*. At the end of pollen zone V (spruce zone) *Valvata tricarinata tricarinata* reaches its maximum percentage and is replaced in pollen zone IV (pine zone) by the form *Valvata tricarinata perconfusa*. In pollen zone III (white pine, oak), which is part of the Hypsithermal interval, the carinated *Valvata* are replaced by *Valvata tricarinata unicarinata*, a few *V. tricarinata basalis* and *V. tricarinata infracarinata*. Above pollen zone III all the *Valvata tricarinata* are of the form *simplex*.

These correlations tentatively suggested that the mollusks invaded the lake only at the end of zone V (the spruce zone) which had a colder climate than that of today. This invasion seems to correspond with the first appearance of marl in the lake. The species such as *Pisidium nitidum* and *P. ventricosum*, which are known to prefer a colder habitat, reach their maximum percentage at this stage and decrease in the upper zones. In zones III and IV (the pine zones) which were warm, dry periods during which most of the marl was precipitated, *Valvata tricarinata perconfusa*, *V. tricarinata unicarinata* and *Pisidium nitidum* form *contortum* reached their maximum percentage. *Valvata tricarinata simplex* and *Gyraulus parvus*, on the other hand, increased rapidly from pollen zone VI to pollen zone III (the middle of the pine

period). In zone II (low pine, high hemlock and oak; a warm moist period) the following species reached their maximum percentage: *Valvata tricarinata simplex*, *Gyraulus parvus*, *Amnicola lustrica*, *A. limosa*, *Heliosoma campanulata*, *H. anceps*, *Pisidium ferrugineum* and *Sphaerium lacustre*. In the pollen zone I, which begins with the rapid increase of ragweed and other non-arboreal pollen types, mollusks become so rare that it is impossible to plot population curves. This is perhaps due to a change in the chemistry of the lake.

DISTRIBUTION OF CANADIAN ARCTIC MARINE GASTROPODA

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(SUMMARY)

The first mollusks recorded from the Canadian Arctic were brought back by the exploring ships of the nineteenth century. More records have since been contributed by scientific expeditions of various kinds. However, the extensive collections of the Fisheries Research Board of Canada since 1947 from Canadian Arctic waters have yielded most of the data for the following brief survey of gastropod distribution. (Macpherson and Clarke)

The marine gastropods here discussed are those of the seas of Arctic Canada from the Arctic Ocean in the northwest to Hudson Strait in the southeast, including Hudson Bay. Specimens of most species have been found alive in less than 40 meters. No specimens are available from more than 200 meters.

The waters of the Canadian Arctic are for the most part low in temperature and salinity, and are covered with ice for seven months of the year. Considerable variation in these factors is caused by summer warming, winter cooling, melting ice, run-off from the land, and the varying distribution of ice. Duration of positive temperatures during the breeding season and low productivity are important limiting factors of the region. About 105 species of marine gastropods, of 21 families, have been recorded in the Canadian Arctic. Only four of these (Buccinidae, Turridae, Trochidae, and Lamellariidae) account for two-thirds of the species.

Arctic gastropod faunas display a few peculiarities. In East Greenland, where occur many of the same species, not one gastropod has yet been found to have pelagic larvae (Thorson, 1944). Very few forms live in the littoral zone. This is said to be due to ice-scouring (Thorson, 1944). Some species, elsewhere littoral, occur at sub-littoral depths in the Barents Sea (Zenkevitch, 1963). *Acmaea testudinalis* (Müller) was collected alive in arctic Canada down to 100 meters. On the other hand, *Littorina saxatilis* (Olivi) was found in Hudson Bay by Clarke (1963) throughout the intertidal zone. Davis (1936) also found them in Ungava Bay in the intertidal zone and remarked on the severe ice action there.

About 38% of the Canadian Arctic marine gastropods are circumpolar species. The others fall into two main groups. One, representing about 48%, is the "Atlantic Arctic" group which inhabits all but the southwest part of northern Canada and Greenland, as far as Svalbard, Novaya Zemlya, or Severnaya Zemlya. The "Pacific" group, with 14% of the species, inhabits an

area extending somewhat west of Bering Strait but east only as far as Dolphin and Union Strait.

This division is partly explainable by the directions of surface ocean currents which enter the Canadian Arctic with some force from the Arctic Ocean in the northwest and from the Arctic and Atlantic Oceans in the east. In the Beaufort Sea, their direction is anticlockwise (Collin, 1962).

The Canadian Arctic gastropod fauna can be divided into a "polar" element, of about 20%, an "arctic" element of about 50%, and a "boreal" element of about 30% of the species present. The first is found throughout the Canadian Arctic including the most northerly stations but barely extends down the Labrador coast or into Hudson Bay. "Arctic" species have not been found at such high latitudes and many extend well into the waters of the North Atlantic, though not necessarily keeping to the same depths throughout their ranges. For example, *Puncturella noachina* (L.) has been found at 18m in arctic Canada and 1100m off Portugal. The "boreal" species inhabit the mixed waters of the North Atlantic and in the Canadian Arctic are found mainly in Hudson Strait and Ungava Bay. Some have penetrated Hudson Bay and some live on the east coast of Baffin Id. as far north as Cumberland Sound.

Dunbar (1951) has characterized the water of Hudson Bay as Arctic. In the summer, unlike the conditions in other more typical Arctic water, the top hundred meters become very warm and have a very low salinity, these conditions becoming most extreme toward the southeast. Almost half of all the Arctic gastropods live within the basin, however. Below 100 meters, the water is comparable to other Arctic regions and one species, at least, *Sipho tortuosus* (Reeve) has only been found at these depths although known from 40 meters in Prince Regent Inlet. Of the ten species recorded from sea level or below in James Bay, only three have been found alive.

Pleistocene glaciation probably completely destroyed the molluscan life of shallow arctic waters. Repopulation has no doubt occurred at different times from a number of regions.

Some species, for example *Boreotrophon fabricii* (Beck), appear to have come from the Atlantic. The Arctic Ocean may have contributed *Oenopota novayasekliensis* (Leche), known from the Kara Sea and Eureka Sound, Ellesmere I. Nesis (1962) and Golikov (1963) have shown that a number of species of the genus *Neptunea* have dispersed at different times from the Pacific Ocean into the arctic. Doubtless extinctions have also occurred. Post-glacial uplift and freshening of its waters are probably the causes of the sparse living marine fauna of James Bay.

Continued collecting, accurate ecological data, and better oceanographic information should make possible, in the future, a more precise and comprehensive discussion of Canadian Arctic gastropod distribution.

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ZOOGEOGRAPHIC AND EVOLUTIONARY PATTERNS IN NORTHERN LYMNAEIDAE AND PLANORBIDAE

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(SUMMARY)

Taxonomic revisions of the Lymnaeidae and Planorbidae in the Hudson Bay and Arctic watersheds, using all discernable characters and an abundance of material, has resulted in the recognition of 42 species and subspecies as valid. These are listed below:

Lymnaeidae: *Fossaria dalli* (Baker), *F. decampi* (Streng), *F. exigua* (Lea), *F. modicella* (Say), *F. parva* Lea, *Stagnicola arctica* (Lea), *S. atkaensis* (Dall), *S. catascopium catascopium* (Say), *S. c. nasoni* Baker, *S. c. preblei* (Dall), *S. kennicotti* Baker, *S. palustris* (Müller), *S. proxima* (Lea), *S. reflexa* (Say), *S. caperata* (Say), *S. montanensis* (Baker), *S. bulimoides* (Lea), *Pseudosuccinea columella* (Say), *Bulinnea megasoma* (Say), *Lymnaea stagnalis appressa* Say, *L. s. sanctaemariae* Walker; Planorbidae: *Gyraulus deflectus* (Say), *G. circumstriatus* (Tryon), *G. parvus* (Say), *Armiger crista* (L), *Promenetus exacuus exacuus* (Say), *P. e. megas* Dall, *P. umbilicatus* (Cockerell), *Menetus cooperi* Baker, *Planorbula armigera* (Say), *P. campestris* (Dawson), *Helisoma anceps* (Menke), *H. a. royale* (Walker), *H. campanulatum campanulatum* (Say), *H. c. collinsi* Baker, *H. trivolvis trivolvis* (Say), *H. t. subcrenatum* (Carpenter), *H. pilsbryi infracarinatum* Baker, *H. binneyi* (Tryon), *H. corpulentum corpulentum* (Say), *H. c. vermilionense* Baker, *H. c. whiteavesi* Baker.

Some additional conclusions derived from this work, to be published in detail later, are as follows:

- (1) The recognition of *Fossaria decampi* as specifically distinct from *F. obrussa* (Say) is supported by striking differences in morphology, ecology, and zoogeography.
- (2) *Stagnicola atkaensis* (Dall) (= *S. randolphi* (Baker)) and *S. kennicotti* Baker probably survived and speciated in the Beringian Refugium during the Pleistocene.
- (3) *S. catascopium* (Say) (= *S. emarginatum* (Say)) shows usually high intra- and inter-population variability in several characters. Only two population groups are considered distinct enough from *S. catascopium* (*s. str.*) to merit taxonomic recognition.
- (4) *Fossaria perplexa* Baker and Henderson has bicuspid first lateral radular teeth and is probably a morph of the highly variable *S. bulimoides* (Lea).

- (5) *Stagnicola montanensis* Baker occurs in the Rocky Mountains of southern Alberta as well as in the western United States. Its fine sculpture of spiral rows of crescents serves to distinguish it from *S. caperata* but not from several other species of *Stagnicola*.
- (6) *Menetus cooperi* Baker and *Helisoma binneyi* (Tryon), both known hitherto only from west of the Rocky Mountains, also occur east of the mountains in central Alberta.
- (7) Four distinct subspecies of otherwise widespread species, viz. *Stagnicola catascopium nasoni*, *Lymnaea stagnalis sanctaemariae*, *Helisoma anceps royalense* and *H. campanulatum collinsi* all occur only in Lake Superior and nearby adjacent portions of the Lake Superior and Hudson Bay watersheds. Similar isolative and adaptive factors, possibly associated with the unique ecology of Lake Superior, may have contributed to the differentiation of all four subspecies.

NOTES ON THE TAXONOMY AND ZOOGEOGRAPHY OF THE COLUMBELLIDAE

GEORGE E. RADWIN

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(ABSTRACT)

The taxonomy of the Columbelloidae, a little-studied buccinean family, has been studied with emphasis on its western Atlantic representatives.

Columbellids may be characterized by their small size, their narrowly pedunculate foot, and their highly concentrated nervous system.

Shell characters and details of radular dentition have been used in the taxonomy of this group. Despite earlier indications, the radular dentition of the Columbelloidae has frequently proven quite valuable in the proper assignment of species to genera and in the understanding of generic relationships.

On the basis of both shell and radular characteristics:

- 1) the range of *Amphissa* H. and A. Adams has been extended to include both the western and eastern Atlantic regions with the assignment to it of *Anachis haliaeeti* Jeffreys.
- 2) the range of *Cosmioconcha* Dall has been extended to include a part of the western Atlantic with the assignment to it of *Anachis calliglypta* Dall and Simpson from the Gulf of Mexico and *Columbella nitens* C. B. Adams from the Caribbean region.
- 3) the proper assignment of *Nassarina* Dall to the Columbelloidae (more on a radular basis than on a shell-morphological one) has been accomplished.
- 4) the erection of a new genus based on "*Nitidella*" *laevigata* L., definitely distinct from *Nitidella* (type species *N. nitida* Lam.) has been found necessary.
- 5) the range of *Zafra* Iredale has been extended to include the Caribbean region of the western Atlantic with the assignment to it of "*Anachis*" *pulchella*.

Members of the family Columbelloidae exhibit great diversity in both shell form and niche differentiation. These last have arisen in a geologically relatively short time, for most columbellid genera first appear in the Miocene.

Zoogeographical studies indicate the existence of at least three distinct distributional patterns: 1) Gulf of Mexico—south limited, 2) Gulf and Atlantic coast, 3) Circum-Caribbean—north limited, and a single species endemic to Bermuda.

NOTES ON SOME MOLLUSCA OFF THE COAST OF NORTH CAROLINA

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(ABSTRACT)

In 1965 a submerged reef-like structure was discovered at a depth of between 80 and 100 meters about 43 miles off the coast of North Carolina's Onslow Bay. A description of the reef and its fauna was published by Menzies, Pilkey, Blackwelder, Dexter, Huling and McCloskey (1966).

In April of 1966 and 1967 the reef area was again sampled—this time by Dr. Jenner and associates while aboard the Duke University research vessel the "Eastward." The 1966 sampling, in the general area of Lat. 34° 10' N and Long. 76° 10' W was apparently on the reef described by Menzies and associates. Sampling was done by means of a Van Veen Grab and a small biological trawl. In 1967 the following three general locations were sampled using only the small biological trawl: Lat. 34° 10' N and Long. 76° 08' W at a depth of 70–80 meters; Lat. 33° 51.5' N and Long. 76° 28.5' W at a depth of 75–100 meters; and Lat. 33° 31' N and Long. 76° 55' W at a depth of 85–90 meters. Rough weather hampered the 1967 sampling, thus the two upper sampled areas were on a smaller nearby reef and the southernmost sampled area was just east of the reef on its sandy outer shelf. The following mollusks were found which had not been previously recorded from off the North Carolina coast or whose previous North Carolina records were in question:

Calliostoma marionae Dall 1890

?*Cymatosyrinx pagodula pagodula* Dall 1889

Turritella variegata Linne 1758

Cythara cymella Dall 1889

Epitonium krebsii Morch 1874

Fenimorea halidorema Schwengel 1940*

Hyalorisia sp.

Daphnella lynneiformis Kiener 1840

Crucibulum auricula Gmelin 1780

Williamia krebsii Morch 1877

Trivia antillarum Schilder 1922*

Tylodina americana Dall 1890*

Neosimnia piragua Dall 1889

?*Nucula delphinodonta* Mighels & Adams 1842

Cypraeassis testiculus Linne 1758

Pecten chazalier Dautzenberg 1900*

Cymatium labiosum Wood 1828*

Spondylus americanus Hermann 1781

Bursa thomae Orbigny 1842*

Lima scabra form *tenera* Sowerby 1846

Pusia albocincta C. B. Adams 1845*

?*Laevicardium sybariticum* Dall 1886*

Crassispira ebenina Dall 1890*

Cuspidaria granulata Dall 1903

* Indicates living or recently dead specimens.

In addition a total of 50 gastropod and 37 bivalve species were recorded which Menzies et al. (1966), Vivas and Gray (1966), and Wells and Grey (1964) had not recorded from the offshore Onslow Bay area of North Carolina.

ARCHITEUTHIS—THE GIANT SQUID

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It was first in September, 1873, and then a month later, that the Rev. Mr. Moses Harvey, amateur naturalist and a man of considerable scientific acumen and curiosity, became the proud possessor of the first specimens of giant squid of the family Architeuthidae. I say first specimens, meaning of course, the first specimens to be brought to the attention of scientists for observation and study.

Before this serendipitous event the giant squids were relegated to the same category of natural phenomena as were sea serpents and the abyssal monsters. It is in part providential and unplanned that the type locality for *Architeuthis harveyi* is the very waters which front upon the new Marine Sciences Research Laboratory of Memorial University of Newfoundland.

Newfoundland has always figured prominently in sightings and records of the giant squids. The animals are, of course, cosmopolitan, and apparently they wander the high seas, but it is in the northern North Atlantic that they most often come ashore and most of the sightings and strandings have been made in isolated parts of the numberless miles of coastline which characterize this island.

Recourse to the records, both scientific and newspaper accountings, as well as discussions with all manner of people, led to the conclusion that there was in fact a cyclic pattern evident in the sightings. Briefly, it became apparent that the Architeuthids became stranded about the island of Newfoundland in periods corresponding to every third decade, i.e., the 1870's, 1900-1910, and the 1930's. The previous last such specimen was found in 1935. Based on this hypothesized cycle, it was in 1963 that I predicted the "return" of the giant squids into Newfoundland's coastal waters in the decades of the 1960's. In fact, no fewer than ten of these animals have either been reported or have come into our possession.

Needless to say, these are magnificent cephalopods. The largest specimen we have secured reaches an overall length of 31 feet—21 feet of which is the tentacular length, and the body is slightly over 9 feet in length. Animals of both sexes have been encountered, yet none have demonstrated any sign of being sexually mature. In all instances the stomachs and caecae were empty and we can but speculate on the actual food of these predatory cephalopods. Detailed morphological and histological studies are under way and very little of this can be mentioned here. However, something of what we have learned of the taxonomy of these animals should, in fact, be included.

No fewer than four species have been reported as coming from the northern North Atlantic. From the western North Atlantic have been reported *Architeuthis harveyi* Verrill and *A. princeps* Verrill. From the waters of the European side of the northern North Atlantic have been reported *A. dux* Steenstrup

and *A. clarkei* Robson. Again, space dictates that we cannot go into too much detail, but one of the chief characteristics of diagnostic importance separating these four species is the configuration of the caudal fin. On the basis of this characteristic, and all of those of diagnostic significance, I can conclude that there is but one species in the northern North Atlantic and that this is probably *A. dux* Steenstrup, bearing in mind that final adjudication of this should be based on rules of taxonomy.

DISSOCIATION AND REAGGREGATION OF MOLLUSCAN CELLS¹

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(ABSTRACT)

There has been very little information reported on the *in vitro* culture of mollusk cells. One of the problems deterring such studies has been the difficulty encountered in obtaining intact dispersed cells. All the methods generally employed for the dissociation of cells of other animals, such as sponges, or vertebrates, were investigated and proved unsuitable for snails. These methods consisted of chelation of metals with EDTA (versene), deletion of divalent or monovalent cations, and enzymatic digestion of intercellular material to separate the tissues. During the course of the present study, a satisfactory method to obtain intact cells was found.

Tissue was obtained from the ovotestes of adult specimens of *Helix pomatia*. Aseptic technique was employed throughout the experiments. The results indicate that solutions for the dissociation of molluscan cells require the presence of two carbohydrates, galactose, and trehalose, in addition to an enzyme, trypsin. Under these conditions all the cells normally found in the ovotestes were released intact and were viable. The necessity for the presence of sugars for dissociation suggests that at least some of the cells are bound or have intercellular attachments of a hitherto unknown nature.

Microscopic examination of the cell suspension, once the cells had been dissociated, revealed that such cells produce pseudopodia of two kinds—one, a slow-moving lobose type, and the other an active and flexible filose extension of the cytoplasm.

The same experiments demonstrated that the dissociated cells, when centrifuged, reaggregate into histologically organized tissues within 10 minutes. It is of note that only a few adult animals, such as the sponges, have been reported to show reaggregation. Two factors, centrifugation and cellular adhesiveness, appear to play the major roles in the degree of reorganization of the cells. Pseudopodial activity, present in the cells, is suggested as a third factor in the reaggregation of the molluscan cells.

¹ This investigation was supported (in part) by a research grant (AI 07364) from the National Institutes of Health, U.S. Public Health Service, and (in part) by a research grant (GB-3133) from the National Science Foundation, Washington, D.C.

² Supported by Public Health Service Fellowship F2-AI-32, 179.

THE FRESHWATER MOLLUSCA OF TAIWAN (FORMOSA)¹

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In 1905, Pilsbry and Hirase (*Proc. Acad. Nat. Sci. Phila.*, 1905, p. 720-752) catalogued and briefly reviewed the land and freshwater mollusks of Taiwan (Formosa). Kuroda (1941, *Mem. Fac. Sci. Agric., Taihoku Imp. Univ.*, 22 (4): 65-216) listed all known Taiwan mollusks, both marine and non-marine. The current study adds to this information, especially in regard to the distribution of the freshwater species. Our data are based on specimens collected by the senior author and J. B. Burch in 1962, and specimens sent to the Museum of Zoology by Robert E. Kuntz of the U.S. Naval Medical Research Unit No. 2, Taipei, from 1957 to 1962.

The following gastropods were collected: ARCHAEOGASTROPODA: *Neritina pulligera* (Linnaeus), *N. plumbea* (Récluz) [Neritidae]; MESOGASTROPODA: *Viviparus chinensis* (Gray), *V. quadratus* (Benson) [Viviparidae]; *Oncomelania hupensis formosana* (Pilsbry & Hirase), *O. h. chiui* (Habe & Miyazaki) [Hydrobiidae]; *Stenothyra formosana* Pilsbry & Hirase [Stenothyridae]; *Bithynia fuchsianus* von Möllendorff, *B. misellus* (Gredler), *Parafossarulus manchouricus* (Bourguignat) [Bithyniidae]; *Assimineia kurodai* Habe, *A. hayasii* Habe, *Paludinella taiwanensis* Habe [Assimineidae]; *Semisulcospira libertina* (Gould) [Pleuroceridae]; *Thiara scabra* (Müller), *Melanoides tuberculatus* (Müller), *M. formosensis* (Smith), *M. costellaris* (Lea), *M. junceus* (Lea), *M. riqueti* (Grateloup), *M. granifera* (Lamarck) [Thiaridae]; BASOMMATOPHORA: *Radix auricularia* (Linnaeus), *R. ollula* (Gould) [Lymnaeidae]; *Helicorbis umbilicalis* (Benson); *Segmentina hemisphaerula* (Benson), *Hippeutis peipinensis* (Ping & Yen), *Gyraulus spirillus* (Gould) [Planorbidae]; *Ferrissia* sp. (cf. *niponica* (Kuroda) [Ancylidae].

The following bivalves were also collected: HETERODONTA: *Corbicula fluminea* (Müller) [Corbiculidae]; SCHIZODONTA: *Anodonta woodiana* (Lea), *Cristaria discoidea sautteri* Haas, *Nodularia douglasiae taiwanicus* (Pilsbry) [Unionidae].

As a result of the dense population and intense agricultural activity in Taiwan, many natural habitats have been polluted or destroyed. A large number of freshwater mollusks occur in man-controlled environments, e.g., irrigation and drainage ditches, rice paddies and artificial fish culture ponds. Others appear to be restricted to relatively natural streams, e.g., the Neritidae, the Assimineidae, *Semisulcospira libertina*, *Thiara scabra*, *Melanoides costellaris*, *M. junceus*, *M. riqueti* and *Ferrissia* sp. All of the latter had rather limited distributions. The neritids were found in only a few of the northernmost coastal plain streams. *Paludinella taiwanensis* was found in the northern third of the island, and the two species of *Assimineia* were found along the western coastal plain in a few isolated localities. *Melanoides costellaris* was found only from the island of Lan-Ysu off the southeastern coast of Taiwan (Reigle, 1963, *Quart. J. Taiwan Mus.*, 16 (½): 8187). *Melanoides riqueti* was

¹ This study was supported (in part) by funding under Public Law 480, Section 104 (c), and (in part) by a research grant (T1 AI 41) from the National Institute of Allergy and Infectious Diseases, U.S. Public Health Service. From the Bureau of Medicine and Surgery, Navy Department, Research Task MR 005.09.1606.

found only at Lu-Kang, Chang-Hua Co., near the central western coast. *Melanoides juncus* was found only in the southern and eastern coastal plains.

Oncomelania hupensis formosana was found in only a few agricultural environments. The most important of these were near I-Lan I-Lan Co.; Pu-Yen, Chang-Hua Co.; and Yueh-Mei, Kao-Hsiung Co. *Oncomelania hupensis chiui* has been recorded only from its type locality at A-Li-Lao, Taipei Co.

Ferrissia sp., *Hippeutis peipinensis* and *Helicorbis umbilicalis* were the only pulmonates found with restricted distributions. *Ferrissia* sp. was found only at Nei-Men, Kao-Hsiung Co. in southern Taiwan. *Hippeutis peipinensis* was found only in the western coastal plains and *Helicorbis umbilicalis* was taken only from the eastern side of the island.

Corbicula fluminea was the only widely distributed bivalve species. *Anodonta woodiana* was taken from three localities in the northern half of Taiwan, and *Cristaria discoidea sautteri* was collected from three localities in the central western coastal plain and from one locality in the northeastern plain of I-Lan Co. *Nodularia douglasiae taiwanicus* was taken only at Liu-Ying, Yun-Lin Co.

Some of the freshwater mollusks of Taiwan are of medical and veterinary importance (Abbott, 1948, *Bull. Mus. Comp. Zool., Harvard*, **100** (3): 245-328; Hsieh, 1959, *Formosan Sci.*, **13**: 99-109; Kuntz, et al., 1961, *J. Formosan Med. Assoc.*, **60** (9) : 809-824). *Semisulcospira libertina* is apparently the first intermediate host of the lung fluke *Paragonimus westermani* and of the intestinal fluke *Metagonimus yokagawai*; *Bithynia fuchsianus* and *Parafossarulus manchouricus* are the first intermediate hosts of the liver fluke *Clonorchis sinensis*; *Segmentina hemisphaerula* is the main snail intermediate host for the intestinal fluke *Fasciolopsis buski* (*Helicorbis umbilicalis* and *Hippeutis peipinensis* have also been implicated); *Oncomelania hupensis formosana* is the intermediate host of a non-human strain of the blood fluke *Schistosoma japonicum*; *O. h. chiui* is the first intermediate host of a rat lung fluke, *Paragonimus iloktsuenensis*, and has been experimentally infected with the Japanese strain of *Schistosoma japonicum*; *Corbicula fluminea* occasionally transmits echinostome infections; *Radix auricularia* and *R. ollula* have been implicated as intermediate hosts of the liver flukes *Fasciola hepatica* and *F. gigantica* in other oriental countries, but they have not yet been reported to transmit these diseases in Taiwan.

ON THE EVOLUTION OF TORSION IN THE LIMIDAE (BIVALVIA)

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(ABSTRACT)

Unique among bivalve molluscs, the Limidae are characterized by having the shell and visceral mass rotated through 180° with respect to the foot. An analogy was made between this curious asymmetry and the torsion of the Gastropoda, and an attempt was made to explain the adaptive significance of torsion in the Limidae.

It was noted that the foot is twisted through a few degrees with respect to the visceral mass in recent members of the Pectinidae. Twisting of the foot occurs soon after settlement of the pediveliger and is brought about by delayed growth of the right anterior region of the body and rapid growth of the left

posterior region, accompanied by loss of three of the pedal retractor muscles to leave only the left posterior retractor. The adaptive significance of this growth pattern seems to be that it ensures that the byssus remains in the direct line of contraction of the pedal retractors while the body changes its orientation with respect to the substratum. It was suggested that the initial stages of torsion of the foot in the Limidae came about by twisting of the foot as in the Pectinidae. This was correlated with the loss of the original posterior pedal retractor muscles. Full torsion of the foot on the visceral mass was accompanied by the development of new posterior pedal retractor muscles.

It was suggested that the functional significance of torsion is that it stabilizes the body during the drastic change in orientation which occurs during the post settlement stages of development of the Limidae. Previous workers have suggested that the adaptive value of this change in orientation is that it raises the posterior inhalent region of the body into the water above the substratum and increases the efficiency of food collection.

A PROPOSAL TO REGISTER ANTIQUARIAN SHELL BOOKS

MART HULSWIT
New York Shell Club

(SUMMARY)

The older literature in the field of conchology and malacology is becoming rapidly rarer and more expensive. Yet book dealers and print sellers are finding it lucrative to break up old copies and sell the illustrations from even such classic works as Martini and Chemnitz's "Conchylien Cabinet," Martyn's "Universal Conchologist," and Knorr's "Les delices des yeux. . ."

New and growing institutions are finding it progressively more difficult and more expensive to acquire some of these works, and yet they are continually being destroyed in the above manner, and being lost for all time.

A nostalgic respect for even the unscientific publications of past centuries prompted me to propose a system of registration, preferably under the auspices of the AMU, of all literary works relating to Mollusca, that were published before the year 1870, copies of which are in the private hands of members of affiliated shell clubs. The volunteer manpower of the clubs across the country should make it possible to include the registration of those works found in large libraries, public and institutional. The simple assignment of a number to each copy of a given work, its individuality identified by bookmarks, manuscript notes, or, where needed and permitted, a rubber stamp giving its number. Such an accumulation in a file card system, one card for each known copy of a work, would offer a valuable research aid to future amateurs and workers on the bibliography of mollusks, offer a worthwhile activity for the many members of the AMU, and arouse enough interest in the material available that works will be sold intact instead of by the page. Having undertaken such a project of registration of copies in the hands of members of the New York Shell Club and found in the large collection of the New York Public Library, I submit that such a project on a nationwide basis is quite feasible, not as time-consuming as might be supposed, and a very thorough census could be compiled in a very few years.

I will make available to secretaries of AMU affiliated shell clubs a mimeographed instruction pamphlet describing how to go about starting a registration project among interested members, and will continue my contribution by registering New York City area collections.

Interested individuals or those with publications they wish to register will please write to me, MART HULSWIT, c/o New York Shell Club, Inc., American Museum of Natural History, New York, N. Y., 10024.

MALACOLOGIA—FIVE YEARS OF PUBLICATION¹

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(ABSTRACT)

A small group of malacologists (J. B. Burch, Melbourne R. Carriker, Robert Robertson and Dwight W. Taylor) in June 1961 discussed the feasibility of promoting an international journal which could publish either short or long papers on any aspect of malacology and in one of several different languages. Later, Elmer G. Berry, Allyn G. Smith and Norman F. Sohl became affiliated with this group, and very recently it was joined by J Frances Allen, Kenneth J. Boss, George M. Davis and Charles R. Stasek. This group, which sponsors and directs *Malacologia*, was incorporated under the laws of the state of Michigan as the Institute of Malacology in December, 1961.

Although we felt the need of a new malacological journal to help meet the increasing demands of mushrooming research, we were not convinced that our colleagues throughout the world felt the same way. Accordingly, a questionnaire was submitted to 192 malacologists and other zoologists working with mollusks.

The response was encouraging: 80% of the questionnaires were returned; 92% of those who replied favored establishment of a new journal as proposed, and many favored it strongly; 6% were undecided and only 2% opposed the establishment of such a journal.

The funds for the establishment of *Malacologia* and for its maintenance during the production of the first three volumes were generously awarded by the U.S. National Science Foundation (a grant of \$11,037). The first issue of *Malacologia* appeared in October, 1962, and since that time we have published five volumes in 14 numbers.

Malacologia has tried to have a competent yet truly international editorial board. The editorial board currently consists of thirty-six editors who have represented the following twenty-five countries: Australia, Austria, Brazil, Canada, Chile, Denmark, Egypt, England, Ethiopia, Finland, France, Germany, Ghana, Holland, Hungary, Japan, New Zealand, Rhodesia, Romania, Scot-

¹ *Malacologia* was established with the aid of a grant (G-24250) from the National Science Foundation, Washington, D.C.

² Supported (in part) by a Public Health Service research career program award (number K3-AI-19, 451) from the National Institute of Allergy and Infectious Diseases, U.S. Public Health Service.

land, South Africa, Sweden, Uruguay, U.S.A. and U.S.S.R. Since 1962, the General Editor, Anne Gismann, has been based in Egypt. J. M. Huber was appointed Managing Editor in 1966, to replace J. B. Burch.

Authors contributing papers to the first five volumes of *Malacologia* (excluding Vol. 5, No. 1) represent the following nineteen countries: Argentina, Australia, Brazil, Canada, China, Egypt, England, France, Germany, Holland, India, Italy, Japan, Liberia, New Zealand, South Africa, U.S.A., U.S.S.R. and Wales. In addition, four other countries (Algeria, Austria, Sudan and Sweden) are represented by authors who have had their papers accepted but not yet published.

The various articles in *Malacologia* have been published in their original languages, which, in the first five volumes included English, French, German and Russian. The great majority of the papers have been in English. In the first four numbers of *Malacologia*, abstracts of each article were printed in five languages: English, French, German, Russian and Spanish. However, providing this service caused undue difficulties and expense and resulted in considerable delay of publication of each issue. Accordingly, beginning with Volume 2, Number 2, *Malacologia* has restricted the preparation of abstracts to one Germanic language (English), one Romance language (Spanish) and one Slavic language (Russian), unless other abstracts are supplied by the authors.

Abstracts of *Malacologia* articles are published by *Biological Abstracts*, the Institute of Scientific Information of the U.S.S.R. Academy of Sciences, and The Food and Agricultural Organization of the United Nations.

Malacologia will publish either the abstracts or the full articles (to be decided at the Congress) of the Third European Malacological Congress, to be held in Vienna in September, 1968. These will go into a special Proceedings issue, similar to that published for the Second Congress. *Malacologia* also published the Proceedings of the First European Malacological Congress, not as an issue of the journal, but as a separate publication for the Congress Committee.

Information on subscriptions can be summarized as follows (total for each year): 223 subscriptions for 1962, 525 for 1963, 651 for 1964, 698 for 1965, and 715 for 1966. Four hundred and forty-six of the current subscriptions are from the U.S.A., and 269 from other countries. Subscription price for *Malacologia* has been U.S. \$5.00 per volume since its initiation. At present, we do not anticipate any change in subscription price.

It is our opinion that the journal has now been successfully launched and that it will serve the international community of scientists for many years. At this time we would like to note our appreciation to the Sponsor Members of the Institute of Malacology for their constant and continuing support in all phases of the production of the journal, and to the General Editor, Anne Gismann, for her critical and unselfish efforts to make *Malacologia* a scholarly publication. We would also like to express our appreciation to the authors who have supported the journal by submitting many manuscripts and to our subscribers, whose subscriptions allow for the financial operation of the journal.

STUDIES ON SUCCINEIDAE¹

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(ABSTRACT)

The stylommatophoran family Succineidae is of special interest because of the wide variation in chromosome numbers among its species and also because the lowest haploid chromosome numbers known in the Mollusca occur in its subfamily Catinellinae. Currently, several aspects of the male and female reproductive tracts and features of the radula and jaw are used to characterize some of the genera, but the anatomy of many of the species has not yet been critically studied. The present classification of the Succineidae is still based largely on shell characters, which, because of little diversity and considerable convergence, give fragmentary or unreliable aid in systematic analyses. The unique cytological and anatomical features of the Succineidae and the need for a systematic study of the family on a worldwide basis led to the initiation of the current study, which is an investigation of available species using techniques of electrophoresis, immunology and cytology in conjunction with anatomy and shell morphology.

The Succineidae were divided into two subfamilies by Ohdner (1950, *Proc. Malacol. Soc. London*, 28: 200-210), the Succineinae and Catinellinae, on the basis of presence or absence of a penial sheath. According to Zilch (1959, *In: Schindewolf, Handbuch der Palaozoologie*, Lief. 1, 2; 6: 197-202, Borntraeger, Berlin), the subfamily Succineinae (penial sheath present) contains nine genera and fifteen subgenera occurring in North America, Europe, Asia, Africa and on various Pacific Islands, while the Catinellinae (without penial sheath) is composed of only five genera and three subgenera that occur in North and South America, Europe, Africa, the Orient (including India), and Hawaii.

Haploid chromosome numbers in the Succineidae range from $n = 5-22$. The genus *Catinella*, characterized by the absence of a penial sheath and the presence of a large penial appendix, has cytological information for four of its species: *C. rotundata* has five pairs of chromosomes and *C. vermeta*, *C. gabbi* and *C. texana* have six pairs of chromosomes. The presence of a penial sheath, a small penial appendix and a convoluted epiphallus are anatomical characters of the genus *Oxyloma*. This genus has haploid chromosome numbers ranging from $n = 15-19$ in the ten species that have been studied. *Succinea*, a genus characterized by the presence of a penial sheath, a non-convoluted epiphallus and absence of a penial appendix, has haploid chromosome numbers that range from $n = 11-22$ for the fifteen species investigated.

Fifteen to eighteen proteins can be separated from succineid foot muscle tissue using Canalco disc electrophoresis (stained with naphthol blue black). Five to ten esterases can be separated with the same electrophoretic technique, but using alpha naphthol acetate as a substrate and staining with fast blue R R

¹ Research supported (in part) by a research grant (GB-5601) from the National Science Foundation, Washington, D.C.

² Supported (in part) by a research grant (5 T1 AI 41) from the National Institute of Allergy and Infectious Diseases, U.S. Public Health Service.

salt. Electrophoretically separated foot muscle esterases and other proteins of the North American species *Catinella vermeta*, *Oxyloma retusa*, *Succinea ovalis*, and the European *Succinea putris* are clearly distinct for each species.

Especially useful in showing relationships among species is the technique of immunology, because it can give clear-cut answers regarding "identity," "partial identity" or "non-identity" as to the serological correspondence of taxa of doubtful relationship. Antisera from rabbits have been established for *Catinella vermeta*, *Oxyloma retusa*, *Succinea ovalis* and *Succinea putris*. It is expected that comparative immunological data from many succineid species will yield significant taxonomic information.

THE DISTRIBUTION AND HABITATS OF *CARINIFEX* AND *PARAPHOLYX*¹

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(ABSTRACT)

The genera *Carinifex* and *Parapholyx*, representatives of the planorbid subfamily Helisomatinae, are restricted to the Western United States. Although their shells are quite unique, anatomical studies have confirmed their close relationship to *Helisoma*. Recent accounts have reduced the numbers of recent species of *Carinifex* from seven to three (Taylor, 1966, *Malacologia*, 4 (1): 1-172), and of *Parapholyx* from thirteen to one (Hanna, 1963, *Occ. Paps. Calif. Acad. Sci.*, 43: 1-20). Taylor proposes that *Carinifex* be reduced to a subgenus of *Helisoma* and follows Zilch (1959, *In: Handb. Paläozool.*, 6 (2): 124) in favoring the name *Vorticifex* over *Parapholyx*. The present report deals only with recent species originally assigned to *Carinifex* and *Parapholyx* (= *Pompholyx* Lea).

The former ranges of both *Carinifex* and *Parapholyx* have been greatly reduced by the concentration and eventual disappearance of many of the Great Basin lakes and streams. *Carinifex newberryi* (Lea) has been collected with plants in Lake Tahoe from depths as great as 150 feet (Frantz & Cordone, 1966, *Biol. Soc. Nevada Occ. Paps.*, 8: 1-12) and 300 feet (Hanna & Smith, 1937, *Calif. Fish & Game*, 23 (3): 244-245). I have found many living specimens of this species burrowing in the mud, sand and volcanic debris of the following water bodies: Eagle Lake and the Fall River, California, and Jackson Lake, Wyoming. These specimens were collected from depths ranging from only a few inches to over thirty feet. Movement through the substrate is somewhat similar to that of unionids. The head-foot extends into the substrate, expands and abruptly pulls the rest of the animal forward. The carina, characteristic of the shell of this genus, serves as an efficient plow as the animal burrows. Eggs are usually deposited on living or dead shells, or on some other firm surface. Although the type locality of *Carinifex minor*

¹ Field work supported (in part) by the National Science Foundation Training Program in Systematic and Evolutionary Biology (GB-3366) at the University of Michigan.

² Supported (in part) by a research grant (5 T1 AI 41) from the National Institute of Allergy and Infectious Diseases, U.S. Public Health Service.

Cooper is Clear Lake, Lake Co., California, this species is presently much more abundant in the Blue Lakes, a few miles upstream. Here, this species is found most frequently on the undersides of the rocks which may be picked up from the steeply sloping bottom. I collected live specimens of *Carinifex ponsonbii* Smith from the soft mud of a canal leading to the western side of Upper Klamath Lake, the type locality of this species. The soft substrate of this habitat was very similar in texture to that from which *C. newberryi* was collected. Burrowing and egg laying behavior are similar for the two species. A major difference between this lake and the habitats of other species of *Carinifex* is its extreme productivity. The great abundance of algal food may account for the large size of many of the mature individuals of this species.

Parapholix effusa (Lea) has been collected from depths of 300 feet in Lake Tahoe (Hanna & Smith, 1937; Frantz & Cordone, 1966). I found this species on rocks and other hard substrata in the upper Sacramento River (above the Shasta Dam and its lake), Eagle Lake, the Rising River, Burney Falls, and the Fall River (California); Upper Klamath Lake, Crater Lake, and the Deschutes River (several localities) (Oregon). Mr. R. R. Talmadge (personal communication) has also collected *P. effusa* from rocks in the Klamath River in Humboldt Co., California. Alcohol specimens deposited in the Museum of Zoology, University of Michigan by D. W. Taylor are from such important new localities as the Owyhee River in Oregon, the Yakima River in Washington, and several localities along the Snake River in western Idaho. Although *P. solida* Dall (1870, *Ann. Lyceum Nat. Hist.*, 9: 333-361) from White Pine, Nevada was described in considerable anatomical detail, no recent collections of this form have been reported. This seemingly disjunct range extension may be explained by the confluence of the Humboldt River drainage and former Lake Lahontan. Fossil forms of *Parapholix* are very common around the shores of the remnants of this great lake (e.g., Pyramid and Winnemucca lakes, Nevada).

The waters in which these two genera are found alive are usually quite low in total dissolved solids (about 50-400 ppm.) when compared to the present concentration of many Great Basin waters (greater than 1000 ppm.) where only fossils are now found. It is interesting that *Carinifex* once extended into waters draining the saline soils of the Bonneville Basin, while *Parapholix* was apparently restricted to waters cutting through igneous rocks and alkaline soils.

ENDODONTID LAND SNAILS OF RAPA ISLAND; PATTERNS AND PROBLEMS IN SPECIATION

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(ABSTRACT)

Study of 4,105 specimens of endodontid land snails from Rapa Island resulted in the recognition of seventeen species, only one of which had been previously described. Three species are composed of three geographic subspecies and a fourth species had two distinct races. The other species are monotypic. All material was collected between May 13-17, 1828 by Hugh Cuming or in July,

1934 by members of the Bernice P. Bishop Museum Mangarevan Expedition.

The relative abundance of these species showed little relationship to the theoretical models of MacArthur and King. A brief survey of distribution pattern types showed classic examples of a base stock that is now restricted in range and being displaced by more advanced taxa. Illustrations of several species and some structural details were used to demonstrate evidence of secondary size reduction in one genus.

General patterns of variation in the Rapan taxa were compared geographically with the variation patterns seen in another center of endodontine evolution, Mangareva Island, and within the entire subfamily Endodontinae. Deviations from certain basic structural types are the result of single, massive alterations in patterns of shell growth which were demonstrated graphically. A radical alteration in shell sculpture found only in Rapa Island species was first demonstrated, then shown to be operable in one pattern during sub-specific differentiation and another when specific level differentiation is involved. The predictive value of this and several other general evolutionary trends was discussed in relation to surveys of species known only from fossils.

Since the Endodontinae, except for certain Hawaiian taxa, are restricted to the ground stratum in heavy, undisturbed forest, they offer relatively unique opportunities for the study of evolutionary trends without the distortions introduced by ecophenotypic variability.

POLYEMBRYONY IN BULININE SNAILS¹

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(Read by Gary L. Pace)

(ABSTRACT)

The occurrence of polyembryony in egg masses of mollusks has been reviewed by Crabb (1931, *W. Roux' Arch. Entw.-mech. Orgn.*, 124: 332-356) and it appears that this condition is widespread. Earlier, Crabb & Crabb (1927, *Biol. Bull.*, 53: 318-327) reported polyembryony in 3 species of freshwater snails, *Physa sayii*, *Lymnaea* (= *Stagnicola*) *palustris* and *L. stagnalis appressa*. In none of these was evidence for a monozygotic origin of polyembryony available. Michelson & Schork (1958, *Naut.*, 72: 3-5) reported the first case of monozygotic conjoined embryos in *Biomphalaria glabrata*, in which three embryos shared one heart.

The present study was made on seven species and subspecies of *Bulinus* (Basommatophora: Planorbidae) raised in the laboratory. The frequency of polyembryony for the various species ranged from 0% for *B. forskalii* to 0.29% for *B. truncatus truncatus* (Table 1). A total of 20 polyembryonic eggs was obtained from the various bulinine species, with the numbers of embryos ranging from two to five. Fifteen eggs had two embryos each, one egg had

¹ This investigation was supported (in part) by a research grant (5 T1 AI 41) from the National Institute of Allergy and Infectious Diseases, U.S. Public Health Service.

TABLE 1
Polyembryony in *Bulinus*.

Snail species*	Chromo- some number (n)	Origin	No. of eggs examined	Polyembryonic eggs		No. of embryos in each polyembry- onic egg
				No.	%	
<i>Bulinus</i>						
<i>B. forskalii</i>	18	Gambia	4,478	0	0.00	
<i>B. tropicus</i>	18	Kenya	8,320	5	0.06	2, 2, 2, 4, 4
<i>B. guernei</i>	36	Gambia	6,349	2	0.03	2, 5
<i>B. t. truncatus</i>	36	Iran	1,366	4	0.29	2, 2, 2, 4,
<i>B. t. truncatus</i>	36	Sudan	5,571	3	0.05	2, 2, 2
<i>B. t. rohlfsi</i>	36	Ghana	1,027	2	0.19	2, 3
<i>B. cf. sericinus</i>	36	West Aden	1,573	1	0.06	2
<i>B. sp.</i>	72	Ethiopia	5,167	3	0.06	2, 2, 2

* Uninfected with *Schistosoma haematobium*.

three embryos, three eggs had four embryos each and one egg had five embryos. Mrs. Nancy Giles of our laboratory found 11 embryos in one egg of *B. guernei* from Senegal.

When only two embryos occurred in one egg, the embryos developed and hatched normally. As the embryos per egg increased in number, there was a proportional decrease in the size of the embryos at the time of hatching. When five embryos occurred in an egg, they reached only $\frac{1}{3}$ to $\frac{1}{2}$ normal size at hatching, but later fed and grew normally. In the case of the egg with 11 embryos, all developed normally until the nutrition was exhausted, then they died in the egg. It is clear that nutrients contained in one egg can support the development of 5 embryos, but not as many as 11. Early death of some embryos occurred for unknown reasons, but this was probably not related to the number of embryos per egg, since death of embryos was also seen to occur sometimes in normal eggs.

Evidence for monozygotic origin of polyembryony was not obtained in the present study. However, evidence for dizygotic twins was obtained in one case. This egg was found early enough that 2 pre-cleavage ova could be seen. The ova were of normal size, which suggested their independent origin. They were apparently enclosed in the same egg by accident.

Snails infected with *Schistosoma haematobium* showed a higher frequency of polyembryony than non-infected snails. This suggests that the causative factor may be the interference by cercariae or sporocysts with the passage of ova through the female ducts. Crabb & Crabb (1927, *op. cit.*) suggested that the pressure of the contracting gizzard of the snail might cause polyembryony. In *Bulinus forskalii*, the smaller egg size may explain the failure of finding polyembryony in this species, since there may be less chance of more than one ovum being enclosed in one egg membrane due to the smaller amount of albumen.

A TAXONOMIC STUDY OF SOME SPECIES OF THE FRESHWATER
SNAIL GENUS *SEMISULCOSPIRA* IN JAPAN
(Gastropoda: Mesogastropoda: Pleuroceridae)

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(ABSTRACT)

One of the most commonly encountered genera of freshwater snails in the Orient is *Semisulcospira*. More than thirty species and subspecies have been described from Japan, including the islands of Okinawa and Ogasawara. Identifications of these nominal species are difficult because of the great amount of variation in shell shape, structure and coloration exhibited within the genus. Species of *Semisulcospira* have been defined previously almost solely on characters of the adult shell. Kajiyama & Habe (1961, *Venus*, 21 (2): 167-176) have indicated that characters of embryonic shells taken from the pallial brood pouch may be useful in distinguishing species of this genus. Morphological information on the soft anatomy of the species of *Semisulcospira* is almost non-existent, except for Itagaki's (1960, *Venus*, 21 (1): 41-50) study of the gross anatomy of *S. libertina*.

Because of the general lack of information on the genus, the uncertainty of the interspecific systematics, and the lack of knowledge of characters for precise species discrimination, we undertook to investigate in detail several characters which showed taxonomic promise (chromosome cytology and embryo shell morphology), and then to see if there was any correlation between the data resulting from these studies and those obtained from a careful re-examination of adult shell characters.

We found individuals of various shell types to have the following haploid chromosome numbers: 7, 12, 13, 14, 18 and 20. In the generally conservative Gastropoda, this is a rather wide range of chromosome numbers. Cells of several different shell types with the same chromosome number ($2n = 26$; $2n = 24 + 2$) had strikingly different karyotypes, i.e., those of two shell types (*Semisulcospira decipiens* and *S. niponica*) had nearly all metacentric chromosomes, whereas another (*S. nakasekoe*) had only about one-half metacentrics, the rest being acrocentric chromosomes. Dividing cells of a third shell type (*S. reticulata*) had all acrocentric chromosomes, with no metacentrics.

We found that the shells of embryos taken from the brood pouches showed considerable total morphological variation, but that when any one embryo shell type was compared with the chromosome cytology of its parent, there was almost no shell variation of those embryos from various adults of any one particular chromosome type. That is, the chromosome cytology of the various shell types correlated perfectly with embryo shell types. The embryonic shell characters observed were: size, shape, sculpture, and color. In addition, the number of embryos per adult of each shell type was found to be significant.

¹ Supported by a research grant (GB-3006) from the National Science Foundation, Washington, D.C., and a Research Career Program Award (No. 5-K3-AI-19, 451) from the National Institute of Allergy and Infectious Diseases, U.S. Public Health Service.

TABLE I
Chromosome Numbers of *Semisulcospira*.

Species	Chromosome Number (n)	Locality
<i>Semisulcospira</i>		
<i>S. habei habei</i>	7	Uji River
<i>S. h. yamaguchi</i>	7	Lake Biwa
<i>S. niponica</i>	12	Lake Biwa
<i>S. decipiens</i>	12	Lake Biwa
<i>S. reticulata</i>	12	Lake Biwa
<i>S. nakasekoeae</i>	13	Uji River
<i>S. multigranosa</i>	14	Lake Biwa
<i>S. libertina</i>	18	Shimoda
<i>S. ornata</i>	18	Hakone
<i>S. trachea</i>	18	Hakone
<i>S. reiniana</i>	20	Uji River

Because we could separate our specimens according to cytology and embryonic shell characters, we made a statistical study of the adult shells. The characters we observed or measured were shell lengths and widths, spire increment angles, numbers of whorls, rib numbers, basal cord numbers, lengths and widths of apertures, lengths of body whorls, presence or absence of nodes or ribs, and shell color patterns. We chose the largest ten per cent of the populations to characterize each species in terms of adult shell characters and to obtain embryonic shells for a statistical study of embryo shell characters. We found that there was not a complete intergradation of adult shell characters, as previously suggested by some workers, but that a distinct characterizable adult shell type, with definite, and in general, non-overlapping shell characters, characterized each cytological and embryonic shell type. We then went to original species descriptions and comparisons of our adult shell material with type specimens. From this information we determined the nomenclatural status of each of the species we investigated.

Cytological results are shown in the table above. Some individuals of various of the populations had supernumerary chromosomes, some of which paired with regular chromosomes of the complement, forming trivalents or quadrivalents.

Semisulcospira is a part of the Oriental fauna characteristically found in abundance in the belt of regional overlap discussed by Kawamura (1918, *In: Japanese Freshwater Biology*, 1: 1-362, Hokabo, Nihonbashi, Tokyo), i.e., throughout Honshu, Kyushu, Korea, and the Ryukyu Islands, as well as Formosa and mainland China. Quite possibly *Semisulcospira* invaded Japan from East Asia several times with one or two representatives of different genetic stock (i.e., the *S. niponica* and *S. libertina* groups). Several conditions for speciation have been present within Lake Biwa: an immense lacustrine volume divided into numerous niches in the accompanying drainage systems, and a long period of time. Endemism and sympatry have probably resulted because of the drop in lake level with subsequent appearance of elevated barriers preventing immigration or emigration. The shrinking lake forced the association of numerous forms within the limits of the present lake basin and the

present single drainage system of the Setagawa River. The drop in lake level possibly resulted in other populations perishing or being excluded in other drainage systems. One such example of exclusion is *S. kurodai*. A million years of relative geological stability probably allowed further speciation or incipient speciation such as evidenced by *S. habei habei* and *S. habei yamaguchi*. The former is found within the Seta River system and the latter is spread throughout Lake Biwa and is sympatric with populations of other species of *Semisulcospira* living in the lake.

ECOLOGY AND DISTRIBUTION OF THE MARINE SHELLED MOLLUSCA OF BARBADOS

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(ABSTRACT)

Barbados is a small island, 21 miles long by 11 miles wide. It lies 90 miles to the east of the Lesser Antilles from which it is separated by depths of over 1,000 fathoms. Its upper terrestrial cap, Pleistocene, is very permeable; therefore the fluvial environments are small and unimportant as molluscan habitats. The shores are sandy or rocky, quite irregular in outline and therefore fully exposed to wave action and other erosive agents. Thirty species (all rock forms) were recorded from the supralittoral and intertidal zones. *Echininus nodulosus* is not found on the island.

The shallow shelf is confined to reef-flats, interruptedly present along the shore, and extending from 10 to 70 meters from the shoreline. These are covered by about 3 feet of water at high tide. The substrate is sandy, rocky or a combination of both with patches of *Thalassia* sparsely established. Sixty-six species were recorded from this zone; 59 of these belong to the epifauna and the majority live in protected niches such as under rocks, in crevasses and depressions.

Between the margin of the reef-flats and the 15-fathom line, the nearshore shelf, the bottom varies from rocky to sandy. Active fringing coral reefs thrive along ten miles of the upper half of this zone on the leeward side of the island. A total of 233 species were recorded from this zone; only 76 of these belong to the epifauna.

The deep water fauna is only known from the leeward side of the island where all the explorations with the dredge have so far been carried out. From 15 to 713 fathoms (intermediate shelf to middle slope) the bottom varies from muddy to sandy, coarse gravel, rock or coral. The most productive area has been between 75 to 125 fathoms. A total of 411 species was recorded; 38% of these belong to the epifauna; 27% are infauna; 6% epibenthic; and 29% unspecified. A high percentage of the species was found dead and, therefore, these are not useful as indices for bathymetric limits.

Conclusively, the intertidal and shallow water benthic molluscan communities of Barbados are subjected to ecological limitations and partial isolation, the latter because of the unfavorable course of the North and South Equatorial Currents and the existing depths between the island and the other territories. Periodically, however, the latter current, upon a change of its course to the

north, may transport larvae of benthic species from the northeast coast of Brazil. This is indicated by several land forms which very likely reached Barbados by mechanical transport, i.e., driftwood and floating plants driven by this current from the former locality.

Notwithstanding the above limitations and isolation, the fauna is fairly rich. 761 species and subspecies were recorded. They are divided as follows: Gastropoda 526, Amphineura 10, Scaphopoda 30, Pelecypoda 194, and Cephalopoda 1.

Characteristically the fauna is Caribbean/West Indian. It originated from a Tethyan stock in Miocene-Pliocene times. There are no endemic forms. Many of the species range from Brazil to as far north as Cape Hatteras, N.C. The same distributional pattern is shown by some which are also found as fossils from the above geologic periods. Several of the recent species are also found in the Indo-Pacific region; their representatives reached the Caribbean via the Tethys Sea.

ELECTROPHORETIC ANALYSIS OF ESTERASES IN *BULINUS*¹

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(ABSTRACT)

Several years ago, Burch (1964, *Malacologia*, 1: 387-400) showed that there appears to be a good correlation between chromosome numbers in the bulinine subgenus *Bulinus* s.s. (Basommatophora: Planorbidae) and the snails' ability to be infected with *Schistosoma haematobium*. We have shown recently that there is not a complete correlation between cytological characters (i.e., chromosome numbers) and those morphological characters (the shapes of the mesocones of the first lateral radular teeth) currently used to separate the *tropicus* and *truncatus* species groups. However, in spite of this and the seeming insignificance and variability of this radular character, it has been used in several recent papers (Schutte, 1965, *Ann. Mag. nat. Hist.*, 8: 409-419; Schutte, 1966, *Ann. trop. Med. Parasit.*, 60: 106-113) to purportedly establish the distribution of the *truncatus* group over a much wider geographic area on the African continent than it was previously known to occur.

Therefore, in order to test various characters of possible taxonomic use, and at the same time to help resolve the cytological vs. morphological character conflict, we have been applying various biochemical tests to bulinine snails. One of these tests is the separation of esterases in foot muscle tissue using Canalco disc electrophoresis. Non-specific esterases were visualized using alpha naphthyl acetate and fast blue RR salt.

¹ This investigation was supported (in part) by a research grant (AI 07279) from the National Institute of Allergy and Infectious Diseases, U.S. Public Health Service, and it was sponsored (in part) by the Commission on Parasitic Diseases of the Armed Forces Epidemiological Board and was supported (in part) by the U.S. Army Medical Research and Development Command.

² Supported (in part) by a Public Health Service research career program award (number K3-AI-19, 451) from the National Institute of Allergy and Infectious Diseases, U.S. Public Health Service.

The species tested were *Bulinus tropicus tropicus* (n = 18) [two Rhodesian populations], *B. natalensis* (n = 18) [four Rhodesian populations], *B. sp.* (n = 18) [one Ethiopian population], *B. truncatus truncatus* (n = 36) [one population from each of the countries Iran, Egypt, Sudan], *B. truncatus rohlfsi* (n = 36) [one population from Mauritania], *B. truncatus ssp.* (= 36) [one population from Corsica and one population from Aden], *B. coulboisi* (n = 36) [two populations from Tanzania], *B. guernei* (n = 36) [one population from Gambia], and *B. sp.* (n = 72) [one population from Ethiopia].

Four to ten esterases were separated from specimens of the various populations. There was variation in Rf values of some esterases among both the diploid and polyploid populations, especially with the more slowly migrating esterases. There was also some apparent qualitative variation in the faintly staining esterases among the two groups of populations, but just how much of this variation was due to lack of resolution has not yet been determined. However, the most significant aspect of the esterase patterns were heavily stained bands in the faster migrating regions. Without exception, two heavily stained esterase bands were present in this region in the diploid populations, and only one such band in each of the polyploid populations. Therefore, in this respect, one pattern is constant for the diploid species and another for the polyploid species.

It is of particular interest that *Bulinus natalensis* showed an esterase pattern similar to the other diploid species, but according to radular characters it has been placed with the tetraploid *truncatus* species group (Mandahl-Barth, 1965, *Bull. Wld. Hlth. Org.*, 33: 33-44). Similar disparities between biochemical characters and radular characters have been shown by C. A. Wright and co-workers (Wright & Ross, 1965, *Bull. Wld. Hlth. Org.*, 32: 709-712; Wright & Klein, 1967, *J. Zool., Lond.*, 151: 199-209), and in the several instances where they had cytological data, a correlation existed between cytology and biochemistry, and not with the radular mesocones. We have previously shown that there was good correlation between cytology and immunology, but lack of correlation between immunology and radular mesocones (Burch & Lindsay, 1966, *Amer. Malacol. Union Ann. Reps.*, 1966, 33: 37-38).

Therefore, we conclude that the shape of the radular mesocones, the main morphological character currently used to separate the *truncatus* and *tropicus* species groups, is unreliable. However, there seems to be no question about the validity of the two species groups; on biochemical, cytological and parasitological grounds they do indeed exist. Whether or not there are any clear-cut morphological distinctions between the two groups, is not known at present. It seems to us that morphological characters other than radulae and terminal male genitalia should come under close scrutiny.

COMMENSAL BIVALVES FROM THE NORTH CAROLINA COAST

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(ABSTRACT)

Five examples of commensal bivalves from the North Carolina coast were illustrated with colored slides. Only one of these at present has been identi-

fied: *Montacuta percompressa* Dall on the sea cucumber, *Leptosynapta inhaerens* (O. F. Muller). A second bivalve occurs attached to the arms of the brittle stars, *Micropholis atra* (Stimpson) and *M. gracillima* (Stimpson). The remaining three species are a part of a remarkable commensal assemblage associated with a large capitellid annelid, *Notomastus lobatus* Hartman, known previously only from the type collections from the Gulf of California at 21 to 35 fathoms. *Notomastus lobatus* has been found recently in the vicinity of Wrightsville Beach, North Carolina, where it occurs from midtide to sub-tide levels in sand-mud. In certain localities it is common. Living in association with *Notomastus lobatus* is a polynoid annelid, *Lepidasthenia varia* Treadwell. There is an almost invariable one to one relationship between these two polychaetes . . . one capitellid, one scale worm. *Lepidasthenia varia* is known from Florida, but the occurrence of these annelids together has not been reported previously. Two species of very highly modified clams live attached to the capitellid; a third type of clam occurs on the scale worm, generally attached under the elytra.

Preliminary study of the two highly modified bivalves associated with the capitellid shows many points of similarity between these two species, but also striking differences. In both, the mantle is greatly developed and highly modified. Mantle fusion is extensive leaving only two pallial openings: a large, inhalant-pedal opening anteriorly and a small exhalant opening located dorsally on a posterior extension of the mantle which forms a "tail." The anterior free edge of the mantle forms a hood which surrounds the wedge-shaped foot. A fold of the mantle may be reflected over the shell, covering it completely, or it may be withdrawn leaving the shell exposed. The valves of the shell are equal and rest as a "saddle" over the dorsum. Although both anterior and posterior adductor muscles are present, the mantle can no longer be withdrawn within the shells. Only one demibranch is present on each side, showing these species to be members of the family Montacutidae. The demibranchs extend backward to the posterior part of the "tail," and, by fusion of their upper edges, separate off an extensive supra-branchial cavity. In one species this cavity is known to serve as a brood chamber, with fully shelled veligers eventually being released.

These two species differ with regard to:

- (1) shape of shell (valves of A more broadly rounded both anteriorly and posteriorly than those of B; umbo of A located anteriorly, that of B more centrally)
- (2) thickness of shell (A thicker than B)
- (3) tooth structure (each valve of A bears a tooth; B without teeth)
- (4) shape and structure of "tail" (end of A not as acute as B; posterior surface of A is smooth, B is papillose)

It seems apparent that these are two new species of the *Entovalva-Devonia-Cycladoconcha* complex. They are the first to be found on a non-holothurian host, and they are apparently the first members of this group to be found in this hemisphere. (The report of Clench and Aguayo, 1931 of *Entovalva perrieri* from Woods Hole, Massachusetts refers to *Montacuta percompressa* Dall; specimens at the Museum of Comparative Zoology, Harvard University were examined by C. E. J.).

Formal taxonomic descriptions of these species await further study and will be published elsewhere.

THE DISTRIBUTION OF THE POSTERIOR PALLIAL NERVES IN *LAMPSILIS VENTRICOSA* (BARNES)

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(ABSTRACT)

In the course of an investigation of a kind of "flapping" behavior which is peculiar to the freshwater mussel subfamily, Lampsilinae, it was found that in gravid females, mantle flap movements are initiated as a strong contraction near the "tail" end of each flap, and proceed simultaneously as a pair of pulses to the eyespot ends of the flaps. Moreover, mantle flap movements in *Lampsilis ventricosa* (Barnes) were noted to be measurably responsive to increments and to decrements of light intensity at low illumination (L. R. Kraemer, Ph.D. dissertation, University of Michigan, 1966).

As part of an attempt to explore the physical basis of mantle flap activity, the present study of the neuroanatomy of *L. ventricosa* was undertaken. In the examination of a number of large specimens, special attention was given to the distribution of nerves coursing from the visceral ganglion into the posterior portions of the mantle, i.e., supra-anal, anal and branchial siphons and mantle flap zones.

The nerve supply to the mantle flap zones was found to be proportionately richer than that of any siphonal area. In addition, just posterior to the "tail" of each mantle flap, there is a small, conspicuous ganglion (e.g., measuring $1.5 \times 2.5 \times 1.0$ mm in a female specimen with maximum valve dimensions of 15×9 cm), which forms connections with several nerves from the visceral ganglion, with nerves which extend distally into the mantle flap, and with nerves which extend forward along the anterior mantle margin. (These posterior mantle ganglia were found also in males, though males possess only mantle flap rudiments.)

A number of the foregoing neuroanatomical details, as well as histological characteristics of the posterior mantle ganglia, and of the nerve fibers within the mantle flaps, were illustrated with slides and discussed briefly.

POSTGLACIAL DISPERSAL PATTERNS OF LITTORAL MARINE MOLLUSKS AND CRUSTACEANS IN EASTERN CANADA

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(ABSTRACT)

The shallow-water marine fauna of eastern Canada illustrates the phenomenon of disjunct or discontinuous north-south distribution. Analysis of the distribution patterns of approximately 225 species of littoral marine and estuarine mollusks and crustaceans in the region from Labrador to southern New England has shown an overall cline of "cold-water" species decreasing southward and "warm-water" species decreasing northward. However, many sub-arctic and boreal cold-water species (e.g., *Mesodesma arctatum*, *Margarites helycinus*, *Gammarus setosus*) are restricted to the north and to the south-

central (northern Gulf of Maine) regions, whereas the temperate zone and Virginian warm-water species (e.g., *Crassostrea virginica*, *Bittium alternatum*, *Ovalipes ocellatus*) are confined essentially to the south and to the north-central (southern Gulf of St. Lawrence) regions. Animal populations having similar temperature requirements are thus isolated from each other by hundreds of miles of climatically unfavorable marine coastlines, particularly during the reproductive period that is critical to natural dispersal and to maintenance of homogeneous populations. How did this come about?

The most satisfactory explanation is historical. Herewith proposed is a sequence of changing physical and climatological conditions in the marine environment during and subsequent to retreat of the ice masses of the last continental glaciation. These suggest changing patterns of faunal distribution and probably postglacial dispersal routes that resulted in the present-day situation.

During the last 15,000 years, the climate in eastern Canada has changed from essentially sub-arctic, with ice fronting along the eastern continental margin, through irregularly fluctuating but increasing temperatures, to an optimum warm or "Hypsithermal" period, significantly warmer than at present and lasting 3-4,000 years. During the past 5,000 years, however, the climate has deteriorated, unevenly, to present-day conditions. Since the Ice Age, the melting of continental glaciers combined with differential down-thrusting of the shelf margins and accelerated by coastal marine erosion, has raised sea levels by approximately 450 feet throughout much of the outer coastal region. Offshore island archipelagos, of considerable size in immediate postglacial times, have gradually been submerged to form a series of extensive marine shoals (e.g., Grand Banks, Sable Bank, Georges Bank, etc.), leaving only the slender strip of Sable Island still above water. During the Hypsithermal period the relatively shallow, island-studded, shelf waters provided a uniformly summer-warm marine environment and dispersal pathway from the Cape Cod region to the Gulf of St. Lawrence. However, subsequent drowning and deepening of the inshore coastal areas and increasing tidal upwelling in the Gulf of Maine have depressed summer temperatures to present-day cool levels. Only the shallow semi-landlocked areas of eastern Canada such as the southern Gulf of St. Lawrence now remain appreciably warm in summer.

Correspondingly, the warm-water fauna first penetrated northward from the Cape Cod peninsular region into the adjacent warming Scotian shallows, eventually reaching the Gulf of St. Lawrence, in the east via Cabot Strait, and in the west through a narrow channel from the Bay of Fundy that persisted until about 9,000 years ago. In post-Hypsithermal times the warm-water fauna gradually disappeared from the cooling open coastal areas and the Gulf of St. Lawrence population became regionally restricted and effectively isolated from the main population in southern New England. Simultaneously, the cold-water fauna penetrated southward and reoccupied the northern Gulf of Maine region from which it was presumably excluded during the Hypsithermal period. Intertidal species that require winter-mild conditions are now extending their ranges along the coast as deepening waters moderate the inshore climate.

The postulated changing postglacial levels of environmental factors and patterns of animal distribution are corroborated by evidence, now rapidly accumulating, from fossil plant and animal material of terrestrial and estu-

arine origin dredged from the offshore banks, from analysis of shelf sediments, from recent archaeological findings, and from the occurrence of terrestrial and fresh-water relict organisms still living in insular and peninsular maritime regions of eastern Canada.

CHANGES AND REDUCTIONS IN OUR FRESHWATER MOLLUSCAN POPULATIONS

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(ABSTRACT)

The rapid growth of industry and population on our continent is producing great changes in our freshwater lakes and rivers. These changes began to unfold about two hundred years ago, beginning with the construction of our first canals, mill dams, and factories. A wide system of canals east of the Mississippi River linked some of the various river systems together. A number of our species of freshwater mollusks have thus moved from one river drainage to another.

The early pollution of the Merrimac and Blackstone rivers of New England eliminated two relatively rare mussels, *Lampsilis cariosa* and *Alasmidonta marginata varicosa*, each found there before this pollution occurred. Thus on one hand we find that the distribution of our molluscan population is being increased by man, while on the other hand it is being decidedly reduced. Let us further explore these two factors.

In general, the spread of freshwater mollusks into other drainages has included only a few common species which can adapt themselves to slowly moving water. Usually they do not seem to over-populate their new locations and therefore their introduction into foreign streams would appear unimportant. However, there are a few exceptions to this. In the United States the oriental clam *Corbicula manilensis* has been dispersed by other means, not altogether presently known, to an extensive area reaching from coast to coast. In many places this bivalve has become so prolific that it threatens to starve or crowd out mussels already living in that area.

Several other factors, however, are destroying our aquatic faunas. Most alarming among these is stream pollution. Pollution takes an immense toll among our mollusks. The June 1967 pollution of the Clinch River in Virginia by the Appalachian Power Company killed hundreds of thousands. Among the many mollusks and other plants and animals killed was the best remaining concentrated population of our AMU symbolic mollusk *Io fluviialis*. The Water Quality Act of 1965, enacted by the United States Congress, gave each state until June 30, 1967 time to adopt certain corrective actions, which if enforced, should eventually clear up the streams in the United States.

Secondly, the destruction of many species which inhabit swiftly running water, is caused by the construction of reservoirs. In this construction on our major river systems it appears that little thought and no constructive action have been shown to preserve natural sections of our rivers. The elimination of many rare species of mollusks which inhabit only the rapids and shoals of large streams has already occurred. Many freshwater mollusks require swift

running, clean water. In this group are such bivalve genera as *Dysnomia*, *Pegias*, *Alasmidonta*, certain *Elliptio*, *Pleurobema*, *Lampsilis* and others. The gastropod family Pleuroceridae is particularly indigenous in swift water. The various species of the genus *Apella* (= *Gyrotoma*) are entirely adapted only to swift water. Most of these species must now be considered extinct since nearly their entire range in the Coosa River of Alabama, to which they are endemic, has been inundated by reservoirs. *Io fluvialis* disappeared from the Tennessee River when the rapids which it inhabits were covered by TVA lakes. It is now found only in the Nolichucky, Clinch and Powell rivers.

Some reservoirs are now under construction for purely political reasons and are not needed. The present construction of the Tellico Dam near the mouth of the Little Tennessee River was resisted in vain by many individuals and organizations. This river has several large reservoirs on it at present with immense storage capacity. The twenty-five odd miles of swift water which remained above its mouth is considered a prime fishing area. Here are found several uncommon naiads and the rare pleurocerid *Eurycaelon anthonyi*. Construction of the dam will result in no long term economic benefit to the area.

Several species of rare mollusks, one of which is *Tulatoma magnifica*, the large viviparid gastropod with bands of prominent tubercules, were destroyed in the lower section of Choccolocco Creek in Taladega County, Alabama, when it was inundated by the impounding of Coosa River waters behind Logan Martin Dam. Some of these species do not live in Choccolocco Creek above the present reservoir. It appears possible that this creek could have been diverted at a point just above its mouth, to flow southward to enter the Coosa below the dam. A great stream which contained an extraordinary amount of endemic plant and animal life would have been preserved.

A third factor which is probably eliminating many mollusks from ponds and streams, is the practice of removing all fish from a body of water so as to eliminate all so-called trash fish. The waters are then restocked with game fish suitable to that area, but not always suitable naiad hosts.

LOCOMOTION IN *APORRHAI*S AND *HALIOTIS*

ALAN SOLEM

Field Museum of Natural History, Chicago

Aporrhais pespelicani is a common inhabitant of mud or mud-gravel bottoms at 30-600 feet depth off northern Europe. It is a specialized herbivore with unique burrowing habits whose biology and locomotion has been reviewed by Weber (1924) and Yonge (1937). *Haliotis tuberculata* is a Mediterranean and European species found inter- and sub-tidally.

Films demonstrating locomotion in these specimens are available through *The Encyclopaedia Cinematographica* and are part of a cooperative library of 1,000 biological and anthropological films available for rental from:

The Audio-Visual Aids Library
The Pennsylvania State University
University Park, Pennsylvania 16802

The films shown are two of several on mollusks and demonstrated surface locomotion in *Aporrhais* and typical locomotion with avoidance reaction in the *Haliotis*.

STUDIES OF THE RADULAE OF TAIWAN MURICID GASTROPODS

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(ABSTRACT)

The systematics of the superfamily Muricea have long been confused in the literature. Most workers consider the number of varices on the shell to be the most important single taxonomically usable character, and J. Q. Burch (1955, *Mins. Conch. Club S. Calif.*, 149: 3-13) has further proposed that all possible characters be employed (i.e., the number of varices; type, shape and size of the spines; size and sculpture of the nuclear whorl; length and width of the siphonal canal; type of operculum; form of the animal; and the radula). However, all of the conchological characters appear to be exceedingly variable, subject to individual and ecological influences. The purpose of the present study is to show that radular characters are important in classification of the Muricea, if the orientation of the radula is standardized.

In the present work the morphology of the radulae of twenty-five species of muricid gastropods from Taiwan (Formosa) are described, and possible relationships of taxa within the Muricea as shown by radular structures are discussed.

The muricids can be divided into two categories on the basis of differences in the rachidian tooth. Genera with 3-cusped rachidian teeth are *Chicoreus*, *Morulina*, *Cronia*, *Nassa*, *Murex*, *Rapana*, *Mancinella* and *Drupella*. Genera with 5-cusped rachidian teeth are *Thais*, *Thaisella*, *Purpura*, *Drupa* and *Drupina*. *Morula* can be considered as an intermediate between the *Chicoreus-Morulina-Cronia* group and the *Thais-Thaisella-Purpura-Drupa* group. *Morula* resembles the *Chicoreus* group in having 3 waves on the anterior side of the rachidian tooth, a concavity ("pit" of Cooke, A. H., 1919, *Proc. malac. Soc. London*, 13: 90-110) on the posterior side of the base, and all the cusps and medial denticles sharply humped marginal angles. *Drupella* and *Mancinella* and *Nassa* and *Chicoreus* also show certain resemblances in radular structure. *Drupina*, although conchologically similar to *Drupa*, is quite different in radular structure.

THE XYLOPHAGAINAE AND TEREDINIDAE—A STUDY IN CONTRASTS

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(ABSTRACT)

The Xylophaginae (Family Pholadidae) are wood borers which replace the Teredinidae in the deep sea. Though they are superficially similar, the species in these two groups differ in many ways. Only four genera of the Pholadidae are wood borers. Two of these, *Martesia* and *Lignopholas* (subfamily Martesininae) are littoral; *Xylophaga* range from the sublittoral in cold waters to the ocean depths in the tropics, and a new genus (also in the Xylophaginae) is known only from deep water. *Martesia* and *Lignopholas* are more or less in competition with the Teredinidae, *Martesia* in warm water

marine habitats and *Lignopholas* in tropical brackish water areas. *Xylophaga* are found in the sublittoral only in colder waters where teredinids are not usually abundant. In warm temperate to tropical areas they are restricted to deeper water below the known depth range of the Teredinidae.

Isolated valves of the Xylophaginae and Teredinidae are difficult to distinguish but the shell is the chief similarity between them. The Teredinidae have apophyses and pallets but lack dorsal plates, while the Xylophaginae lack apophyses and pallets but have dorsal plates. The visceral mass of the teredinids extends well beyond the posterior adductor muscle and the gills are elongated, reaching nearly to the base of the pallets. The xylophaginids are more typical bivalves and neither the visceral mass nor the gills extend beyond the posterior adductor muscle.

Development in the teredinids may take place in the sea or the young may be retained within the gill pouch of the parent to the straight-hinge or pediveliger stage. Species in the first group are generally restricted to large ocean areas (i.e., *Bankia gouldi* in the western North Atlantic; *B. setacea* in the northern Pacific) while the latter are world wide in distribution within their temperature and salinity ranges. Very little is known concerning reproduction in *Xylophaga* but some species appear to retain the young within the burrow (but not a gill pouch) for they are often found attached to the umbonal area of the adult. In other species (i.e., *X. washingtona*, *mexicana*, *dorsalis*, *atlantica* and *globosa*) development apparently takes place in the sea for, though hundreds of specimens of these more common species have been examined, no young have ever been found attached to the parents. It also appears that their larvae do not rise very high in the water column since wood placed at 60 meters off the bottom was not attacked while that on the bottom, in the same area, was heavily attacked.

So far as known, all teredinids and xylophaginids are protandrous hermaphrodites. Observations on other species of *Xylophaga* agree with those of Purchon (1941) on *X. dorsalis* as to the presence of the versiculae seminalis and accessory genital organ. Purchon's suggestion that these structures probably allow for self-fertilization is very plausible but experimental work is necessary to prove it. This adaptation would certainly be of survival value to wood-dependent species living in the deep sea where wood is scarce and the populations consequently small and isolated.

Species of *Xylophaga* occurring in the sublittoral and shelf waters at high latitudes have a greater latitudinal range than those in the deep sea, possibly because wood is more abundant, currents are stronger, populations are less isolated and gene flow is greater. The converse is true in the deep sea and this has led to the isolation of populations, morphological differentiation and subsequent speciation. It is also possible that, in the tropics, where competition with the more efficient teredinids is greatest, the xylophaginids have been able to survive only in the depths. Regardless of the causes, these distribution patterns agree with those of many other benthic invertebrates. Species living in shallower waters at high latitudes are examples of arctic emergence and those restricted to deep water at low latitudes, of tropical submergence.

The 34 known species of *Xylophaga* can be arranged in five species groups—one with 2 species, one with 11 and 3 with 7 species each. They are all allopatric with only one species per group occurring at any one area except in Groups II and IV where 2 species in each are recorded from the Gulf of

Panama. Additional material may show that variable species are involved here. The distribution patterns of the species groups suggest that the present species probably arose from five widely distributed sublittoral species which, with the full emergence of the teredinids, survived only in deeper water. Unfortunately the fossil record is not sufficient to prove this point at the present time.

TREE SNAILS (*LIGUUS*) OF CUBA, HISPANIOLA, AND FLORIDA

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The genus *Liguus* is limited in its distribution to Cuba, the Isle of Pines, Hispaniola, and the southern part of Florida. It ranged on the mainland of southern Florida from near Pompano south to Florida City in hammocks on the Miami ridge and the hammocks or tree islands in the Everglades from north of Pinecrest south to the Bay of Florida and west to near Marco. The northernmost record is from Immokalee which is 34 miles southeast of Fort Myers.

Liguus is not closely related to any bulimoid genera now existing in Central or South America. The nearest appears to be the genus *Corona* of northern South America. Even here the gap between the two genera is large in shell morphology, size, and type of coloration. The occurrence of *Liguus* in Florida is probably due to hurricanes which transported them from Cuba and have since been responsible for their dispersal throughout the islands in most of the Everglades.

Color pattern alone indicates that there have been probably at least three separate introductions: the *fasciatus solidus* group which now occurs on the Lower Keys from Big Pine Key to Key West, the *fasciatus lignumvitae* group of Lower Matecumbe and Lignumvitae Keys, and lastly the *fasciatus roseatus* group which occurs on Key Vaca, Upper Matecumbe to Elliotts Key and all of the southern tip of Florida. Typical *L. fasciatus fasciatus* is limited to Cuba, in Matanzas and Habana Provinces.

The advent of *Liguus* in Florida is relatively recent. According to R. A. Daly (1934, Changing World of the Ice Age, p. 175) the Princess Anne marine terrace was formed in the third Wisconsin Interglacial stage. At this time the eustatic ocean level was some 13 feet higher than at present. Epicontinental seas would have covered all of southern Florida and of course, much of the present coastal areas as well. This would indicate that the present populations of *Liguus* in Florida had their origin in late Pleistocene, possibly only since the last 100,000 years.

Liguus feed on lichens which grow on the bark of trees. On smooth bark trees their feeding tracks can be used as a clue for additional hunting, particularly where there are vines under which they can hide.

Coloration is apparently non-selective as there must be little ocular predation. This appears to be true for tree snails the world over, particularly on insular areas. Color forms in Florida range from white to brownish black with most of the remaining colors present. Color patterns exist as a wash of solid color or as spiral bands, axial streaks, or in combinations of these three types.

Liguus are fast disappearing in Florida. Land clearing for motels, fishing camps, and other building operations are rapidly destroying the hammocks and stands of broad leaf trees where they live. The draining of the 'glades has added materially to the number of fires which occur during the dry season. So far, there appears to be nothing in the immediate future to lessen these destructive forces.

NOTES ON AMERICAN *HASTULA*

JOSEPH P. E. MORRISON
U.S. National Museum

(ABSTRACT)

The genus *Hastula* includes species of Terebridae that live in the intertidal surf-zone of sandy beaches and that burrow under the sand everytime a wave washes them out, just as do the Coquina clams (*Donax*). A search for the identity of some *Hastula* found living near Vera Cruz City, Mexico led to a review of that group. The four known American species of *Hastula* are different in details of shell sculpture, radular teeth, and geographic distribution.

HASTULA LUCTUOSA Hinds 1844. This eastern Pacific species was illustrated by Keen (Sea Shells of Trop. W. Am., 1958, fig. 981). It is recorded in the USNM collections only from Cape San Lucas, Baja California; Mazatlán, Acapulco, and Tehuantepec, Mexico; Panama, and San José, Pearl Islands, Panama. Such scattered locality records indicate a lack of collection rather than limited occurrence.

HASTULA MARYLEEAE R. D. Burch 1965. This most recently described American species (Veliger 7: 242, pl. 31, fig. 4) is known from Galveston Island, Texas, southward all the way to Playa El Morro, south of Vera Cruz City; from Mujeres Island, Quintana Roo; and from the east coast of British Honduras.

HASTULA SALLEANA Deshayes 1859. This terebrid is recorded only from Gulf of Mexico shores. It has been found living from Mexico Beach, Bay County, Florida; west across Alabama and the barrier islands of Mississippi, to Chandeleur Island, Louisiana; from Cameron Parish, Louisiana, along the Texas coast (Pulley, Tex. Journ. Sci., 1952, p. 177, pl. 3, fig. 10) and southward to Vera Cruz, Mexico. The beaches along the south shore of the Gulf of Mexico in Vera Cruz, Tabasco, Campeche, and Yucatan provinces have not yet been searched for *Hastula*.

HASTULA CINEREA Born 1778. This is the West Indian species first figured from Barbados by Lister in 1685. For many years all western Atlantic *Hastula* were lumped under this name because the specific characters of the group were not understood. Now we know that *H. cinerea* (Abbott, Am. Sea Shells, 1954, p. 266, pl. 26g) lives only on the east coast of Florida, from Talbot Island, Duval County, southward; on the shores of the Bahamas, Cuba, Jamaica, Hispaniola, Puerto Rico, St. Thomas, St. Croix, St. Kitts, Nevis, Guadeloupe, Dominica, Barbados, Grenada, Tobago, and Trinidad Islands; and on the continental shores from Wounta Haulover, Nicaragua, southward to Devils Beach, near Colón, Panama; Cartagena, Colombia; and eastward on Brazilian shores between Goyanna, Pernambuco, and Itanhaem Beach, 60 miles

south of Santos, São Paulo. The excellent study by the Drs. Marcus [Bol. Fac. Fil., Cien. Letr., Univ. S. Paulo, no. 260, Zoology no. 23, 1960] has shown that *H. cinerea* paralyzes with its poison teeth and then swallows whole, small Polychaete worms of the families Spionidae and Opheliidae.

The overlapping locality records for *H. salleana* and *H. maryleeae* tell an interesting story. In nearly every gathering from the Texas coast, and from near the city of Vera Cruz, these two forms were found living in the same or adjacent sands, and so were usually left as mixed samples in museum and private collections. The shell sculpture separates the two as species; *maryleeae* completely lacks the spiral rows of pits (punctae) so evident on the shells of *salleana*. These two species may live together without direct competition. Because the hypodermic (poison) teeth of *maryleeae* are only one-fourth the size of those of *salleana*, we assume they are predators on different food-animals in the same sands.

Dr. Morrison illustrated his talk with kodachrome slides of the four American species, of the microscopic sculpture of the shells of each, and of the radula (hypodermic-needle poison teeth) of *maryleeae*, *salleana*, and *cinerea*. Of particular interest was the slide showing the "blonde" and "brunette" color phases of *maryleeae* (all white to very dark purplish shells) that were collected with the grayish *salleana* in the sand of one Texas beach.

COLLECTING MEXICAN FRESHWATER MUSSELS

JOSEPH P. E. MORRISON
U.S. National Museum

(ABSTRACT)

At the invitation of Dr. Salas, the Director, and other scientists of the Institute of Geology of the University of Mexico, I spent November and December of 1966 in southern Mexico.

The freshwater mussel fauna of Mexico includes members of three families:

The South American MUTELIDAE (MYCETOPODIDAE) are represented by the larger smooth shells of the group of *Anodontites* (*Patularia*) *glauca* Lamarck 1819, living as far north as Mazatlán; by the smaller, darker colored *Anodontites* (*Euryanodon*) *bambousearum* Morelet 1851, from the Usumacinta River system; and by *Anodontites* (*Euryanodon*) *cylindracea* Lea 1838, from the Alvarado system south of the City of Vera Cruz.

The true family UNIONIDAE (subfamily ANODONTINAE) includes only species of *Anodonta* in Mexico. *Anodonta*, s.s. is well represented in the Pacific River systems; in the High Plateau of Mexico by *Anodonta impura* Say 1829, and its relatives; and in the Río Grande (Río Bravo) by *henryana* Lea 1857. *Anodonta* (*Pyganodon*) *globosa* Lea 1841, is one of the largest of Mexican mussels. It, or the sub-species *lurulenta* Morelet 1849, was taken alive from a mud-bottom pasture pond near Villa Hermosa, Tabasco; its glochidia are now on record.

The family AMBLEMIDAE (subfamily AMBLEMIDAE) (often called Quadrulidae, subfamily Quadrulinae) includes many endemic species described from Mexico. *Quadrula*, s.s. is represented only in the Río Grande (Río Bravo) system by one dwarf species, *Quadrula couchiana* Lea 1860. Our familiar

"wash-board," *Megaloniaias gigantea* Barnes 1823, ranges southward into the Río Grande (Río Bravo) system; *M. nickliniana* Lea 1834, is from Panuco and/or Alvarado systems; *M. digitata* Morelet 1851, was named from the Usumacinta. *Elliptio opacata* Crosse & Fischer 1893 was taken alive with glochidia in December in Lake Catemaco. It appears to belong to the group of *Elliptio buckleyi* Lea 1843, so abundant in the lakes of Florida. The closely related *Barynaia*s, peculiarly beaded over all or part of the shell, may include different species in every Atlantic river system of Mexico. One female *Barynaia*s specimen was collected from the Usumacinta system, with glochidia in the outer gills in December.

Members of the genus *Cyrtonaia*s were stated by Isaac Lea in 1860 to be relatives of *Elliptio*. *C. coloradensis* Lea 1856, was named from the Colorado River of Texas. In other Texas rivers, including Río Grande (Río Bravo), there is a species named *grandensis* Conrad 1855 (= *berlandieri* Lea 1857). The Panuco system has *C. tampicoensis* Lea 1838, while the Alvarado waters south of Vera Cruz harbor *C. tecomatensis* Lea 1841. *Cyrtonaia*s mussels may also have a short breeding season in the cool winter months, as do some of the *Megaloniaia*s and the *Elliptio* of Lake Catemaco.

The subfamily LAMPSILINAE is represented in the Río Grande (Río Bravo) by species of the genera *Toxolasma*, *Truncilla*, and *Lampsillis*, s.s. *Actinonaia*s and *Disconai*s are among the few groups living in the waters to the south that have been proven Lampsiline, with sexually dimorphic shells. *Pachynaia*s *spheniopsis* with concentrically ridged shells, and the smooth-shelled *Mesonai*s *explicatus* Morelet 1849, also belong here as endemic Mexican Lampsilinae.

JUVENILE GROWTH OF THE SEA SCALLOP, *PLACOPECTEN MAGELLANICUS*

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(ABSTRACT)

Growth rates of adult scallops, based on shell annuli, have been determined and validated by tagging (Merrill, Posgay, and Nichy 1966). Ring counts cannot be applied however, to scallops smaller than 50 mm since the rings, if present, are poorly defined. Apparently, recognizable rings are first formed at sexual maturity—about 50 mm. When sexual products, which make up one-third of the body weight, develop during late winter and early spring, growth processes are possibly diverted towards gonadal development. The resulting slower growth for the remaining body and shell of the animal produces a ring.

Mean sizes of juvenile sea scallops from natural habitats on the ocean bottom were compared with those from navigation buoys at various times of the year. Growth data were analyzed from 42 collections of small scallops which lived and grew on buoys up to 18 months. Since buoys are on station for known periods of time (Merrill 1965), and the season of spawning is known (Posgay and Norman 1958), information on age is reliable. Scallops from buoys grew, on the average, about 5 mm in 6 months, about 12 mm in 1 year,

and about 20 mm in 18 months. Scallops on the bottom grew faster—to about 25 mm in 18 months. Extrapolation of growth curves, derived from the above data, indicates that scallops grow to about 40 mm in 2 years, become sexually mature and form the first discrete ring in 2½ years, and spawn at the end of that year.

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RECENT ADVANCES IN OYSTER CULTURE IN THE FAR EAST

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(ABSTRACT)

Pressures have been increasing for more effective use of the sea as a food source for an expanding human population, much of which already exists on protein-impooverished diets. Farming the edges of the sea with shellfish as a basic initial crop is an important avenue to increase protein production. In-shore farming is surprisingly advanced in some parts of the world, particularly the Far East where amazing progress in oyster culture has been achieved. The Pacific oyster, *Crassostrea gigas*, cultivated in the Far East, is also grown on the North American west coast—in fact much of the U.S. west coast production is based on seed oysters imported from Japan. Other Asian countries would like to export seed and market oysters to the United States. South Korea and Taiwan have strong economic ties with us, and both are developing oyster culture methods.

South Korean shellfish production is concentrated on the south and west coasts. Particularly in the Pusan area, oyster and mussel culture is well advanced; seed rack systems and rafts are used for off-bottom cultivation. The protected waters on the south coast offer excellent opportunities for expanded production.

Taiwan's oysters are grown principally on the west coast, in the Changhua and Tainan areas. Stick culture, in which bamboo stakes are used, is common, and hanging culture from racks is also used. Taiwan oyster production in 1965 was 18.7 million pounds of shucked meats—a figure not far below Chesapeake Bay's production of 22.7 million pounds.

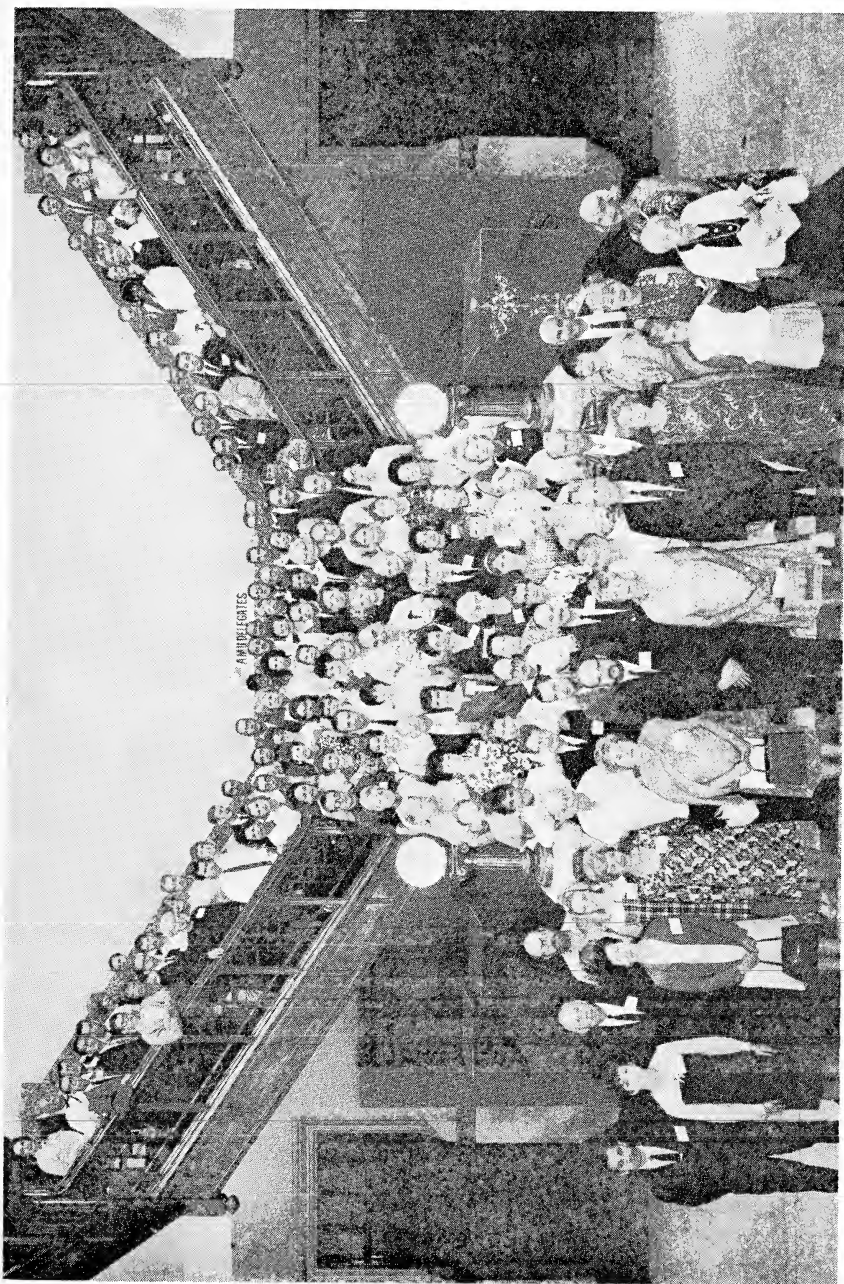
Two major oyster growing areas in Japan are near Hiroshima on the Inland Sea and near Sendai in northeastern Honshu. Rack-supported seed collectors and bamboo rafts are common culture methods. The recent innovation of long-line culture—float-supported ropes with suspended oysters—is expanding rapidly and permits use of open waters for oyster culture. Japanese oyster production, mostly obtained with off-bottom culture, reached 66 million pounds

in 1965, compared with the total U.S. production of 62 million pounds in that year.

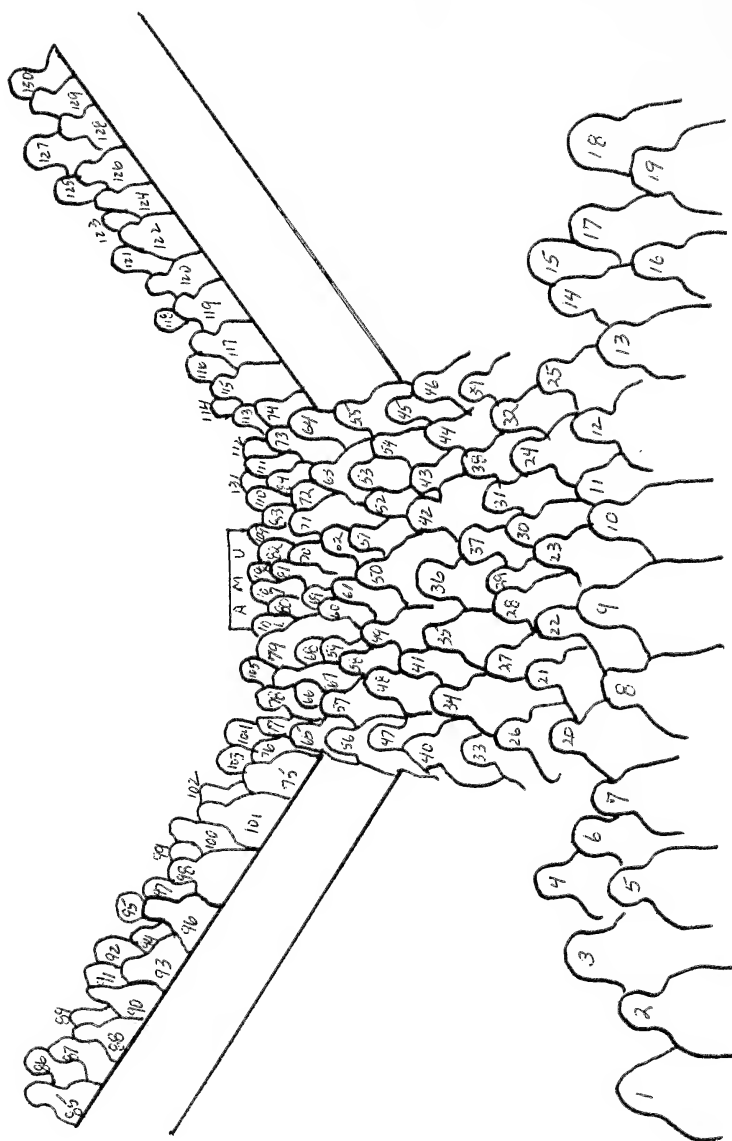
We in the United States have made limited progress toward oyster culture; Long Island has commercial hatcheries and on the west coast Pacific oysters are reared from imported seed from Japan. Many inshore areas along our coasts are amenable to sea farming, and much could be learned from advances being made in the Far East.

AMU MEMBERS AND GUESTS ATTENDING THE 1968 ANNUAL MEETING AT OTTAWA, ONTARIO, CANADA

Dr. Frederick A. Aldrich, St. John's, Newfoundland, Canada
Miss Letha S. Allen, Yarmouth, Nova Scotia, Canada
Mr. Herbert D. Athearn, Cleveland, Tennessee
Dr. and Mrs. Horace B. Baker, Havertown, Pennsylvania
Mr. and Mrs. Alger P. Blaine, Springfield, Massachusetts
Dr. Kenneth Boss, Harvard University, Cambridge, Massachusetts
Mrs. Ward Brown, Lake Worth, Florida
Mr. L. Bottimer, Crawley, Texas
Dr. Edward Bousfield, National Museum of Canada, Ottawa, Ontario, Canada
Dr. John B. Burch, University of Michigan, Ann Arbor, Michigan
Dr. Paul Chanley, Virginia Institute of Marine Science, Wachapreague,
Virginia
Miss Dinah M. Childs, University of Michigan, Ann Arbor, Michigan
Dr. William J. Clench, Harvard University, Cambridge, Massachusetts
Dr. and Mrs. Arthur H. Clarke, National Museum of Canada, Ottawa, On-
tario, Canada
Mr. Arthur R. Clarke, Ottawa, Ontario, Canada
Mrs. Juliette Compitello, Brooklyn, New York
Mr. and Mrs. Vincent Conde, Redpath Museum, Montreal, Quebec, Canada
Mrs. David K. Corey, Blacksburg, Virginia
Mrs. Ruth A. Craine, Norwich, New York
Miss Carroll Dater, University of Connecticut, Storrs, Connecticut
Dr. Derek S. Davis, Dalhousie University, Halifax, Nova Scotia, Canada
Mrs. Ruth S. Dixon, Durham, North Carolina
Dr. D. S. Dundee, Louisiana State University in New Orleans, Louisiana
Dr. William K. Emerson, American Museum of Natural History, New York
City
Dr. Vera King Farris, University of Michigan, Ann Arbor, Michigan
Dr. and Mrs. John H. Ferguson, University of North Carolina, Chapel Hill,
North Carolina
Dr. Dorothea Franzen, Illinois Wesleyan University, Bloomington, Illinois
Dr. Thomas H. J. Gilmour, University of Saskatchewan, Saskatoon, Saskatche-
wan, Canada
Mrs. Louis N. Goethel, San Antonio, Texas
Mr. Henry S. Gordon, New York City
Mrs. Louise Grantier, Willowdale, Ontario, Canada
Dr. Helen Gurkow, Platteville, Wisconsin
Dr. William Heard, Florida State University, Tallahassee, Florida
Miss Karen Heffelfinger, Athens, Ohio
Rev. and Mrs. H. B. Herrington, Westbrook, Ontario, Canada
Dr. Leo G. Hertlein, California Academy of Sciences, San Francisco, California
Fr. Joseph R. Houbrick, Miami, Florida
Mr. Mart Hulswit, New York City
Mrs. Ruth E. Hunkins, Plaistow, New Hampshire
Dr. and Mrs. Skihike Inaba and family, University of Michigan, Ann Arbor,
Michigan
Mr. M. Karl Jacobson, Rockaway, New York



AMERICAN MALACOLOGICAL UNION
Thirty-third Annual Meeting



1. Len Marhue, 2. Katherine Knoke, 3. Dr. W. C. Starrett, 4. Dr. Arthur S. Merrill, Jr., 5. Mrs. W. C. Starrett, 6. Jane Watt, 7. Muriel Smith, 8. Mrs. H. B. Baker, 9. Dr. Arthur H. Clarke, Jr., 10. Margaret C. Teskey, 11. Agnes Mullins, 12. Dr. Leo G. Hertlein, 13. Mrs. Arthur Merrill, Jr., 19. Hellen Nötter, 20. Dr. John H. Ferguson, 15. Dr. John H. Ferguson, 16. Sibyl Calloway, 17. Veronica Johns, 18. Mrs. Arthur Merrill, Letha Allen, 25. Harvey G. Meyer, 26. Myra Taylor, 27. Mrs. Adlai B. Wheel, 28. Paul R. Jennewein, 29. Mrs. Paul Jennewein, 30. Mrs. J. J. Parodiz, 31. Kathleen Tilton, 32. Mrs. Harvey G. Meyer, 33. Ruth A. Craine, 34. Grace MacBride, 35. Dr. Dee Dundee, 36. Dr. Irene Lubinsky, 37. Mrs. H. B. Herrington, 38. Ruth Hunkins, 39. Phoebe Meadows, 40. Mrs. Alger Blaine, 41. Alger P. Blaine, 42. Rev. H. B. Herrington, 43. Mrs. Paul Peters, 44. Elizabeth McKinley, 45. Ruth S. Dixon, 46. Marguerite I. Thomas, 47. Mrs. Donald Shasky, 48. June Snyder, 49. Sharon Snyder, 50. Dr. J. P. E. Morrison, 51. Mrs. J. P. E. Morrison, 52. Adaline C. Westerfield, 53. Mrs. Chas. Jenner, 54. Jeanne Whiteside, 55. Charlotte Johnson, 56. Dr. Donald R. Shasky, 57. Juliette Compitello, 58. Dr. David H. Stansbery, 59. Mrs. David Stansbery, 60. Anne B. Speers, 61. Dr. Harald A. Rehder, 62. Paul Calloway, 63. Dr. Charles E. Jenner, 64. James E. Wadsworth, 65. Dr. Dortha Franzen, 66. Marion Schroth, 67. Mrs. Harold D. Murray, 68. Dinah M. Childs, 69. Nell Corey, 70. Gary Pace, Dr. Ruth D. Turner, 77. Dr. Harold D. Murray, 78. Dr. Artie Metcalf, 79. Bessie Goethel, 80. Charlotte Patterson Morgan, 81. Carol B. Stein, 82. Bonnie Oatis, 83. Albert Lindar, 84. Ann F. Young, 85. Mrs. B. J. Grantier, 86. Gordon Usticke, 87. M. Karl Jacobson, 88. Shi Kuei Wu, 89. Edwin D. McGowen, 90. Dr. Akihiko Inaba, 91. Richard H. Russell, 92. Karen Heffelfinger, 93. Pat Shasky, 94. Mathilde Weingartner, 95. William E. Old, Jr., 96. John A. Krause, 97. Martin L. H. Thomas, 98. Mrs. Ward Brown, 99. Mary Weatherburn, 100. Eugene P. Keferl, 101. Dr. Darek S. Davis, 102. Mrs. Eugene Keferl, 103. Dr. Thomas H. J. Gilmour, 104. Joseph R. Houbrick, 105. Harry Snyder, 106. Douglas McCallum, 107. Dr. Emile Malek, 108. John McCallum, 109. Dr. Kenneth Boss, 110. Dr. Robert Robertson, 111. Hugh J. Porter, 112. Dr. Alan Solem, 113. Dr. H. B. Baker, 114. Dr. M. A. Klappenbach, 115. Dr. John B. Burch, 116. Dr. C. Sindermann, 117. Henry Gordon, 118. L. C. Bottimer, 119. George E. Radwin, 120. Dr. William Heard, 121. Dr. Aurèle LaRocque, 122. Dr. Vera King Farris, 123. Mrs. Hugh Porter, 124. Mrs. Benj Lencher, 125. Dr. Edward Bousman, 126. Judge Benj Lencher, 127. Mart Hulsitt, 128. Carroll Dater, 129. Dorothy Raehle, 130. Dave Shasky, 131. Weston Porter.

Dr. and Mrs. Charles E. Jenner, University of North Carolina, Chapel Hill,
 North Carolina
 Mr. and Mrs. Paul R. Jennewein, Wrightsville Beach, North Carolina
 Mr. Ashley Jeeter, Key West, Florida
 Miss Veronica Parker Johns, New York City
 Mrs. K. L. Johnson, Raleigh, North Carolina
 Mr. and Mrs. Eugene P. Keferl, Columbus, Ohio
 Dr. M. A. Klappenbach, Montevideo, Uruguay, South America
 Miss Katherine Knoke, Victoria, British Columbia, Canada
 Dr. Louise Russert Kraemer, University of Arkansas, Fayetteville, Arkansas
 Mr. John A. Krause, Manchester, Connecticut
 Dr. and Mrs. Aurèle LaRocque, Ohio State University, Columbus, Ohio
 Judge and Mrs. Benj Lencher, Pittsburgh, Pennsylvania
 Mrs. J. Kenneth Lewis, College Park, Maryland
 Mr. and Mrs. Albert Lindar, Chicago
 Dr. Irene Lubinsky, University of Manitoba, Winnipeg, Manitoba, Canada
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 Mr. William E. Old, Jr., American Museum of Natural History, New York City
 Mr. M. Ouellet and Suzanne Henrie, University of Ottawa, Ottawa, Ontario,
 Canada
 Dr. Gary L. Pace, University of Michigan, Ann Arbor, Michigan
 Dr. and Mrs. Jose J. Parodiz, Carnegie Museum, Pittsburgh, Pennsylvania
 Mrs. Paul E. Peters, Kenmore, New York
 Mr. and Mrs. Hugh Porter and Weston, Institute of Fisheries Research, More-
 head City, North Carolina
 Mrs. A. Leslie Potter, Williamsville, New York
 Mr. George E. Radwin, U.S. National Museum, Washington, D.C.
 Mrs. George Raeihle, Elmhurst, New York
 Dr. Harald A. Rehder, U.S. National Museum, Washington, D.C.

Dr. Robert Robertson, Academy of Natural Sciences, Philadelphia
 Mrs. Jeanette M. Rudie, Yonkers, New York
 Mr. Richard H. Russell, University of Michigan, Ann Arbor, Michigan
 Miss Marian M. Schroth, Woodhaven, New York
 Dr. and Mrs. Donald Shasky and Dave, Mike and Pat, Redlands, California
 Dr. and Mrs. Sindermann and family, Bureau of Commercial Fisheries, Oxford, Maryland
 Mr. and Mrs. R. U. Smith, Ottawa, Ontario, Canada
 Mr. and Mrs. Harry P. Snyder and Sharon, McKeesport, Pennsylvania
 Dr. Alan Solem, Field Museum, Chicago, Illinois
 Mrs. Anne B. Speers, Sinton, Texas
 Dr. and Mrs. David H. Stansbery and family, Ohio State Museum, Columbus, Ohio
 Dr. and Mrs. W. C. Starrett, Illinois Natural History Survey, Havana, Illinois
 Miss Carol B. Stein, Ohio State Museum, Columbus, Ohio
 Mrs. Myra Taylor, San Antonio, Texas
 Mrs. Margaret C. Teskey, Marinette, Wisconsin
 Miss Katherine Tilton, Jackson, New Hampshire
 Miss Marguerite Thomas, Swansboro, North Carolina
 Martin L. H. Thomas, Fisheries Research Board, Prince Edward Island, Canada
 Dr. Ruth D. Turner, Harvard University, Cambridge, Massachusetts
 Mr. Gordon Nowell-Usticke, Christiansted, St. Croix, Virgin Islands
 Mr. James E. Wadsworth, University of North Carolina, Chapel Hill, North Carolina
 Mr. and Mrs. Robert J. L. Wagner, Seaford, Delaware
 Karen Walker, Platteville, Wisconsin
 Jane M. Watt, Ottawa, Ontario, Canada
 Miss Pat Way, Ottawa, Ontario, Canada
 Mrs. Muriel and Miss Maryl Weatherburn, Ottawa, Ontario, Canada
 Mathilde P. Weingartner, Staten Island, New York
 Adaline C. Westerfield, Haverford, Pennsylvania
 Mr. and Mrs. Adlai B. Wheel, Syracuse Boys Club, Syracuse, New York
 Mrs. Smith Whiteside, Durham, North Carolina
 Lucille W. Wightman, Westbrook, Ontario, Canada
 Dr. Shi-Kuei Wu, University of Michigan, Ann Arbor, Michigan
 Mrs. John H. Young, Marathon, Florida

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S. Stillman Berry

THE AMERICAN MALACOLOGICAL UNION, INC.
PACIFIC DIVISION
TWENTIETH ANNUAL MEETING

For the fifth time since its inception, the Pacific Division of the American Malacological Union held its annual meeting at Asilomar Conference Grounds on the beautiful wind-swept Monterey Peninsula. The Conference Grounds are situated near the tip of the Peninsula, overlooking the blue Pacific Ocean, in a large grove of cypress and native Monterey pine. The buildings, one of which won two successive awards for design, are both rustic and modern, and blend beautifully with their surroundings. Nearby Monterey was the first capital of California, and many of its old historic adobe buildings are still standing. Here also, Cannery Row, of John Steinbeck fame, still stands, some of the buildings converted to other use, but outwardly little changed—others, huge empty shells, rusted machinery still standing. For collectors, at Pacific Grove is the Great Tide Pool, which John Steinbeck also made well-known. Carmel-by-the-Sea is reached by a seventeen mile drive along the coast. It is interesting country.

Registration began on Wednesday morning, June 28th, at nine o'clock in the Administration Building, under the direction of Virginia Hanselman, Secretary, and Helen DuShane, Treasurer, assisted by George Hanselman, Joe DuShane, Jean Cate, and Twila Bratcher. Members were given maps of the Conference Grounds and of the Peninsula area, plus brochures giving information about points of interest on the Peninsula. Coffee and rolls were available for those who wished to enjoy them.

The meeting was officially opened at two o'clock at Merrill Hall by Chairman Gale Sphon, who extended a welcome to all those attending the annual meeting. He introduced Mrs. Kay Webb, Chairman of Exhibits, who announced that there would be displays both at Merrill Hall and at the Living Room of Surf and Sand, where our informal evening get-togethers were to be held.

The first paper of the meeting was given by Dr. A. Myra Keen, Department of Geology, Stanford University: *REDISCOVERY OF A LOST SPECIES, COLUMBELLA PROCERA SOWERBY 1832.* (See page 68.)

This shell was on exhibit during the meetings.

There followed:

GENERIC CRITERIA IN THE FAMILY ACMAEIDAE by Dr. James McLean, Los Angeles County Museum of Natural History. (No abstract.) Dr. McLean illustrated his paper with accompanying slides.

UPTAKE OF SEA WATER INTO THE BLOOD SPACE OF THE PROSOBRANCH GASTROPOD ACMAEA SCUTUM by Dr. H. H. Webber, Department of Zoology, University of British Columbia, at present doing some work at Hopkins Marine Station, Pacific Grove. (See page 68.)

THE ROLE OF THE OSPHRADIUM IN THE ESCAPE RESPONSE OF THE ARCHEOGASTROPOD, TEGULA FUNEBRALIS (A. ADAMS, 1855) TO STARFISH by Roger Szal, Hopkins Marine Station, Pacific Grove. (See page 69.)

Dr. S. Stillman Berry closed the afternoon session with a most interesting talk on "A FEW RARE BOOKS." Dr. Berry, who has a great love of books, helped build the library at Scripps Institution of Oceanography at San Diego. His talks are always enjoyable, and this one concerned several rare books that he was able to obtain, all of which were on display at Merrill Hall. Old books are always fascinating, and the beauty of some of the illustrations in these was a thing of wonder. (See page 69.)

After dinner that evening, an informal gathering was held at Surf and Sand Living Room, an opportunity for old friends to get together for a visit, and for as many as were able to get at it, to enjoy looking through the AMU-PD Scrapbook. Ruth French, Historian, must have spent many hours of work on the scrapbook, as it is a fascinating record consisting of photographs, newspaper clippings, old programs, all the many things that make history come alive. In the Living Room there were also many interesting exhibits that were viewed and discussed throughout the evening. As a highlight of the evening, door prizes were drawn by number for shells beautifully wrapped, in interesting shapes and sizes, all given by the Conchological Club of Southern California, host club for the annual meeting. Twila Bratcher presided at the drawing. Punch and coffee and cookies were served. It was a relaxing and pleasant evening.

* * *

Thursday morning, the session was opened with a paper by Mr. Robert Talmadge, Research Associate, California Academy of Sciences, San Francisco: **BENTHIC INVERTEBRATES OF NORTHERN CALIFORNIA.** (See page 69.) Colored slides of the dredging boats used and the species discussed accompanied this paper.

This was followed by a paper by Dr. S. Stillman Berry, Redlands, California: **SOME UNUSUAL MOLLUSKS, MAINLY PANAMIC.** (See page 71.) Dr. Berry had an exhibit which displayed Panamic Pelecypoda and Gastropoda.

OPISTHOBRANCHS, RADULA AND VELIGERS by Wesley Farmer, San Diego State College, San Diego, California. The main purpose of the presentation was to show that radulae are an important aspect in the identification of Opisthobranch mollusks. Opisthobranchs from the Gulf of California and the Pacific Coast of Baja California were stressed. Color slides of thirty-one species were shown, some of which are apparently new. Along with the presentation of the animal, its radula (for those species having teeth) was shown in various magnifications. Broad sheets of radula from the scrapers to the narrow linear bands of carnivores pointed out the differences between species and the similarities in the same genus.

At this time, there was a short intermission for a coffee break and to enjoy the displays on exhibit in the meeting room.

The morning session was closed by a film presented by Mr. Nelson W. Baker, Santa Barbara Museum of Natural History: **SOME CALIFORNIA OPISTHOBRANCHS.** This color film was made by the Museum, narrated by Jacque Rogers, and showed opisthobranchs taken predominantly from the Santa Barbara area, but also a few from the Monterey area and from Guaymas, Mexico. Approximately thirty species were shown.

NOTES ON *NEPTUNE* by Robert Talmadge, Research Associate, California Academy of Sciences, San Francisco, was the first paper of the afternoon meeting. Colored slides accompanied this paper. (See page 72.)

The final paper of the day was CEPHALASPIDIANS OF THE EASTERN PACIFIC by Miss Joan Steinberg of San Francisco, with accompanying slides. (No Abstract.)

The group then adjourned to literally rally round the flagpole in front of the Administration Building for the annual group photograph. Then back to Merrill Hall for the general business meeting:

The general business meeting was called to order by Chairman Gale Sphon at 3:35 P.M. on Thursday, June 29, 1967, in Merrill Hall.

It was moved, seconded, and unanimously carried, that the minutes of the 1966 business meeting at Seattle be accepted as published in the AMU Annual Report.

The Treasurer gave a report indicating a current balance of \$476.87. This report is to be supplemented at a later date. The report was accepted as read.

Chairman Sphon then called upon Crawford Cate, Chairman of the Nominating Committee, for presentation of the slate of nominees for the coming year:

Chairman	Mrs. Fay Wolfson
Vice Chairman	Dr. Bruce Campbell
2nd Vice Chairman	Dr. Dwight Taylor
Secretary	Mrs. Barbara Good
Assistant Secretary	Mrs. Virginia Hanselman
Treasurer	Mrs. Helen DuShane
Assistant Treasurer	Mr. Joseph DuShane

As there were no further nominations from the floor, it was moved, seconded, and carried by unanimous ballot that the slate be voted in as presented.

It was moved and seconded that the reasonable expenses of the Treasurer for the past year be paid out of the funds of the AMU-PD, if sufficient funds are available. The motion was carried.

The Chairman instructed the Secretary to prepare a letter to Mrs. Philbrook, Manager of the Asilomar Conference Grounds, thanking her and her staff for their helpfulness to the conference.

Crawford Cate brought up the subject of establishing Asilomar as a permanent meeting place for the annual AMU-PD meeting. After considerable discussion as to the availability of sites, such as colleges (seldom available now because of summer sessions), safety factors, the stimulation of meeting at various cities, and similar matters, Chairman Sphon assessed the consensus as favoring continuation of the existing policy of each Chairman selecting and arranging for the site of the meeting at which he will preside. The necessity of making reservations far ahead, often more than a year, was emphasized.

Mrs. Fay Wolfson moved and it was seconded, that the Chair appoint a committee to study and develop ways and means of increasing Pacific Division funds, with the goal of providing more services and activities for its members at decreased (or at least non-increasing) cost to the individual. Discussion followed, and the motion put to the vote was passed. Chairman Sphon appointed as Chairman of a Ways and Means Committee, Mrs. Twila Bratcher,

and as a member, Dr. James McLean. The Chair was then relinquished to Mrs. Fay Wolfson, who appointed Gale Sphon as a second member of the committee, and then relinquished the Chair to Mr. Sphon.

The membership extended a vote of thanks to all the officers of the past year. It was also moved and seconded that a vote of thanks be extended to the Conchological Club of Southern California and its members for their hospitality and assistance during the conference. The motion passed, and the Secretary was instructed to convey our thanks to the Club.

No further business being presented, the meeting was adjourned.

Thursday evening, we gathered at the Outrigger Restaurant on Cannery Row in Monterey for the annual banquet. The group began gathering at six o'clock to enjoy a social hour prior to the banquet, which was held in a pleasant room overlooking Monterey Bay and its changing marine scene.

Following dinner, Chairman Gale Sphon introduced those at the head table and expressed his thanks to all who had contributed to make the annual meeting a pleasant and successful one. Place cards at the table, decorated by a delightful arrangement of small seashells, were made by Jean Cate.

Mr. Allyn G. Smith, of the Academy of Sciences, San Francisco, was the recipient of the Award of Honor, presented by the AMU-PD to a member in recognition of outstanding accomplishments or contributions in the field of malacology or conchology. As a young man, Mr. Smith became interested in mollusks, and throughout his lifetime, even through a career in a different field, he maintained his active interest in and contributions to natural science. After his retirement from a business career, he became a full-time Research Malacologist in the Department of Geology, and at the same time served as executive assistant to the Director of the Academy of Sciences in San Francisco for five years. At present, he is Associate Curator of Invertebrate Zoology there. He has written many papers, most pertaining to his two special interests, the chiton and the land snail, but also including many fine articles on other subjects. He was president of the American Malacological Union in 1956 and Chairman of the Pacific Division in 1953. Dr. S. Stillman Berry, a friend and associate of Allyn's since his youth, made the presentation. He recalled some of Allyn's school days and gave many personal sidelights.

A special Chairman's Award was presented to Rose and John Q. Burch. Rose and John have written many papers, and their first love is probably the *Olividae*. They have encouraged many amateurs in the field and guided them toward producing something constructive, making available to many their remarkable library. John was Chairman of the AMU-PD in 1950, and President of the American Malacological Union in 1964.

Rose Burch introduced Mrs. Hazel Welchel, whose father, Mr. Andy Sorrenson, hosted the first meeting of this same basic group at Pacific Grove twenty years ago, and which group became the membership of the AMU-PD the following year, under the guidance of Dr. Myra Keen.

Featured speaker at the banquet was Dr. Anne Hurst, from the University of Reading, Reading, Berkshire, England. Dr. Hurst spent some time at Friday Harbor, Washington. We were honored to have her with us. The subject of her talk was "Why Opisthobranchs?" which she illustrated with slides of beautifully prepared drawings. (See page 72.)

Friday was another busy day. The following papers were presented:

OBSERVATIONS ON *ROSENIA NIDORUM* (Pilsbry) AND *ARNE SOCORROENSIS* (Strong) by Dr. Donald Shasky of Redlands, California and member of the Conchological Club of Southern California. (See page 74.)

SOME THOUGHTS ON WEST AMERICAN *TELLINACEA* by Eugene Coan, Stanford University, Stanford, California. Slides of types and other specimens accompanied this paper. (See page 74.)

BATANGAS BONANZA, slides and narration by Jean M. Cate, Los Angeles, member of the Conchological Club of Southern California. In November 1966, Jean and Crawford Cate spent a day at Batangas Bay in the Philippine Islands as the guests of Fernando Dayrit, whose home is in Manila. Mr. Dayrit had sent two expert divers to the area on the previous day, and they worked for a total of three full days in this unusually rich faunal area. The Cates brought home with them all the mollusks collected during the three days. Together with scenic views taken along the road from Manila to Batangas Bay, color slides of many of the more spectacular shells obtained were shown, as well as some of the steps taken in sorting the shells preparatory to the writing of a report by Mrs. Cate called "A Quantitative Study of the Mollusks of Batangas Bay, Philippine Islands," appearing in *The Veliger* 10 (1), 1 July 1967. A total of 33 families, 113 species, and 903 specimens was collected; the Mitridae were first in number of species with 23, the Conidae were first in number of specimens, with 355.

Following a short intermission, Helen DuShane showed a selected series of color slides of rare and interesting mollusks collected by the DuShanes during January and February 1967, from three localities in Mexico: Mazatlán, Sinaloa, Pulmo Reef, Baja California, and Santa Cruz, Nayarit, with accompanying informative narration.

The Reverend Elwood Hunter, Research Associate, Oregon State University, gave a timely talk on CHITONS OF THE MONTEREY AREA, which he considers to be of unusual interest in that it seemingly limits the north or south range of certain species. He suggested the possibility of a re-survey of the area, in order to compare it with the thirty-three species he collected there thirty years ago. Additionally, he discussed briefly preparation of chitons as wet specimens maintained in pure glycerine. In an exhibit, he displayed specimens he had so prepared over twenty-five years ago, among them those used by Ed Ricketts and Jack Calvin in the frontispiece of their book "Between Pacific Tides," and still fully as beautifully as on the day the picture was taken.

THE AMERICAN SPECIES OF THE GENUS *MORUM* by Dr. William K. Emerson, The American Museum of Natural History, was the first paper of the afternoon meeting. (See page 74.)

With slides and narration, Betsy Harrison, Honolulu, Hawaii, member of the Hawaiian Shell Club, illustrated CAMOUFLAGE AND SURVIVAL IN SOME HAWAIIAN MOLLUSKS. She showed *Distorsio anus* camouflaged by a hairy periostracum, aided by the amazing resemblance between the markings of the animal's foot, base of shell, and egg mass; *Murex torrefactus* and *Murex pele* which live on surfaces that they so closely resemble that they are difficult to see; *Cypraea granulata*, endemic to Hawaii, is camouflaged by its many frilled papillae; *Cypraea gaskoini*, also endemic to Hawaii, is indiscern-

ible with its bright red animal on red coral; and *Cymatium clandestinum*, a rare shell as well as a master of camouflage, which usually occurs in excess of 45 feet on mossy bottom. It is found deep within the base of the large *Porites lobata*, with fine silt covering it. A large mat of silky-fine hairy periostracum grows only around the edge of the aperture and normally waves about over the shell, virtually obscuring it and blending it in with the mossy surroundings. The speaker mentioned among those in the open sea, the purple *Ianthina*, which builds its own float of a material resembling saliva. Slides were shown showing a battle between a *Nassarius papillosus* and *Calappa bicornis* (the box crab) in the aquarium of Mr. E. R. Cross, Honolulu, and also of *Cymatium pileare*, apparently a driller, making a meal of *Periglypta edmonsi*.

A PROGRESS REPORT ON THE STUDY OF FOSSIL AND RECENT SPECIES OF THE CYMATIID GENUS *FUSITRITON* COSSMAN, 1903 by Miss Judith Terry, Stanford University. This paper was illustrated with color slides. (See page 76.)

Closing the afternoon session, Mr. Allyn G. Smith, Academy of Sciences, San Francisco, showed a color film, THE SEA OF CORTEZ, the Gulf of California, which is of such great interest for exploration, particularly to those of the Pacific Coast, who find it a prolific area for collecting and research. This film, from the Academy of Sciences in San Francisco, was made up from a combination of various expeditions, and Dr. Lindsay, of the Academy, asked Mr. Smith to present it.

The following paper was announced but was not presented: LATE PLEISTOCENE NONMARINE MOLLUSKS FROM THE STATE OF PUEBLA, MEXICO by Dr. Dwight Taylor, Arizona State University. (See page 76.)

In the evening, the group again gathered in the Living Room of Surf and Sand. Jean Cate showed slides of rare and beautiful shells which she encountered in her travels. Betsy Harrison showed slides taken by Mr. E. R. Cross of Honolulu, of the first *Strombus hawaiiensis*, one of which was discovered by Betsy, found in habitat. This shell was on display during the conference. With Twila Bratcher presiding, more shells were given as door prizes, again through the courtesy of our host club.

* * *

Saturday morning was left free for exploring the beaches or the points of interest in the nearby towns.

Chairman Sphon appointed the following as members of the Auditing Committee: Dr. Edwin Allison, Chairman, Mrs. Jean Cate and Mrs. Mae Dean Richart. Dr. Rudolf Stohler was appointed Mentor-Parliamentarian.

The following were the interesting and stimulating exhibits displayed during the meeting, with the help of Mrs. Kay Webb, Chairman of Exhibits, and her assistant, Mrs. Charlene Neeb:

World-wide *Xenophora*

Philatelic Malacology

Muricidae—Genotypes

Marine Mollusca from Manzanillo, Mexico Area

Panamic *Latirus*

Neptunea

Coloration in Southern California Abalone

Crawford Cate

Jean Cate

Rose Burch

Lawrence Thomas

Joyce Gemmell

Robert Talmadge

Chuck Snell

Joyas y Chucherías de West Mexico
Colubraria procera (Sowerby 1832)
 The Versatility of the Gastropod in its Uses of Hard
 Parts—a Poem “Thought for Food” by Daniel
 Petteward
 Hand drawings of Nudibranchs
 Variation in Color of *Haliotis rufescens*, *H. assimilis*,
 and *H. corrugata*
 Rare and Old Books on Mollusca
 Panamic Pelecypoda and Gastropoda
 Endemic Hawaiian Mollusca
 Growth Series of Mollusca from Cholla Bay, Mexico
 (via the Tom Burches and Mrs. Avery)
 Chitons of the Monterey Bay Area

Don and Ruth Shasky
 Dr. Myra Keen

Dr. Anne Hurst
 Wesley Farmer

Frank Russ
 Dr. S. Stillman Berry
 Dr. S. Stillman Berry
 Betsy Harrison

Phoenix Shell Club
 Rev. Elwood Hunter

Respectfully submitted,
 Virginia Hanselman, Secretary, AMU-PD

* * *

**AMERICAN MALACOLOGICAL UNION—PACIFIC DIVISION
ABSTRACTS AND CONDENSATIONS OF PAPERS
PRESENTED AT 20TH ANNUAL MEETING**

**REDISCOVERY OF A LOST SPECIES, *COLUMBELLA*
PROCERA SOWERBY, 1832**

A. MYRA KEEN
Stanford University, California

(ABSTRACT)

Columbella procera was described by Sowerby in 1832, the type having been collected by Hugh Cuming, presumably in Panama. The species was never figured, perhaps because the sole specimen was immature and not a convincing columbellid. The record was not subsequently cited in the literature. The type, however, still is in the collection of the British Museum (Natural History). By coincidence, three lots of material that can confidently be identified as this form have almost simultaneously come to light early in 1967, two being unidentified fossil specimens in the collections of the U.S. National Museum and Stanford University, the third, and most dramatic of all, four live-taken specimens. These new records are all from the southwestern coast of Mexico—Oaxaca to Colima. Living material was found by scuba-diving; the collector, Lawrence Thomas of Morro Bay, California. He found the shells under boulders in about 50 feet of water in an environment not accessible to dredging or intertidal collecting. The fully mature shells prove to be not columbellid at all but to be instead a large form of *Colubraria*. A specimen measuring 75 mm in length has been presented to the Stanford Collection by Mr. Thomas. Thus, *Colubraria procera* (Sowerby 1832) may be added to the list of west tropical American species.

**UPTAKE OF SEA WATER INTO THE BLOOD SPACE OF THE
PROSOBRANCH GASTROPOD *ACMAEA SCUTUM***

H. H. WEBBER
University of British Columbia

(ABSTRACT)

A water uptake response is described for *Acmaea scutum*. Under certain conditions this gastropod could increase the volume of the soft body parts by approximately 100% by taking sea water from the external environment into the blood space. Evidence for the water uptake response came from experiments using the dye amaranth and the carbohydrate inulin. When inulin or amaranth were dissolved in sea water solutions, these molecules passed into the blood space of the limpet when the increase in volume occurred.

THE ROLE OF THE OSPHRADIUM IN THE ESCAPE RESPONSE OF
THE ARCHEOGASTROPOD, *TEGULA FUNEBRALIS*
(A. ADAMS, 1855), TO STARFISH

ROGER SZAL

Hopkins Marine Station, Pacific Grove, California

(ABSTRACT)

The escape response of *Tegula funebris* to starfish can be triggered both by contact chemoreception of the starfish and by distance chemoreception of a substance exuded by the starfish. The osphradium is indicated as the site of distance chemoreception.

BENTHIC INVERTEBRATES OF NORTHERN CALIFORNIA

ROBERT R. TALMADGE

Eureka and Willow Creek, California

(ABSTRACT)

The drag boat fishermen operating out of Humboldt Bay on the extreme northern California coast may not be formally trained as marine biologists, but they definitely are practical biologists, as their livelihood depends upon their ability to utilize their knowledge of the sea bottom and seamanship to bring in the fin fishes to market. All have an intense interest in the various fishes and invertebrates that are taken incidentally with the fin fishes. They have taken the time and effort to save and preserve many of these invertebrate specimens for me, together with the data as to a precise locality, depth, substratum, and the fin fishes which were taken in the same tows. At the present time it is possible to discuss briefly some benthic associations, as in the past six months sixty-six species of mollusca have reached me from this source, several of which represent either northern or southern extensions of published ranges. Some of the species are little known except in major research collections. The selected colored slides illustrate only a portion of the species, based upon what I considered to be of more interest to malacologists, details of little known species, or extension of ranges.

A FEW RARE BOOKS

S. STILLMAN BERRY

Redlands, California

(ABSTRACT)

Pursuant to an earlier request the speaker had brought a selection of rare books from his library sufficient to fill one of the larger display cases. Each book was separately cited, then briefly discussed. The eighteen volumes shown were variously selected for rarity, beauty of illustration, associational interest, or historical value in West American malacology. Here listed according to date of publication, they were as follows:

Oppian: *Halieutikon*, (Venice, 1517).

The beautifully printed Aldine Press edition.

de Bergen: *Classes Conchyliorum*, (1760).

In itself not a very important book, but of interest as bearing the book stamp of Baron, Georges Cuvier, whose copy it was. The pages, uncut by that owner, are presently maintained in that condition.

Thomas Martyn: Unique assemblage of plates pertaining to *The Universal Conchologist* (1784–86), including apparent preliminaries and rejects as well as many unpublished originals possibly intended for a further volume, some of them of exceeding beauty.

Journal d'Histoire Naturelle, vol. 1, (Paris, 1792).

Among the included papers are seven by Bruguière, including the one in which the type-species of the genus *Typhis* Montfort is first described.

Roeding: *Museum Boltenianum*, "Bolten Catalogue," (1799).

Not the impossibly rare original edition, but Copy No. 1 of the less scarce but yet uncommon Sherborn and Sykes facsimile reprint.

Link: *Beschreibung der Naturalien-Sammlung der Universität zu Rostock*, (1806–07).

Another rarity; this copy of further interest in being a war-reparations item from the University itself.

Species Conchyliorum, vol. 1, pt. 1.

All published. Contains a monograph of *Cymba* by Broderip with magnificent plates and other monographs by G. B. Sowerby.

Beck: *Index Molluscorum*, (Copenhagen 1837).

Hugh Cuming's copy, with his autograph.

T. A. Conrad: *Descriptions of new marine shells from Upper California*, (Philadelphia 1837).

A remarkable paper of its period and one of our truest classics.

G. B. Sowerby 2d: *Conchological Manual*, 1st ed., (London 1839).

Copy inscribed from Mörch to Beck in 1844; contains many MS additions in an unidentified hand.

Bennett: *Narrative of a Whaling Voyage round the Globe—1833 to 1836*, vol. 2, (London 1840).

Capt. C. M. Scammon's copy, with several of his autographs; the book includes much material on Lower California.

Maria Emma Gray: *Figures of Molluscos Animals*—1st edit., vol. 1, (London 1842).

Author's presentation copy to Sir Henry Ellis, with autographs of J. E. Gray (pasted in) and E. R. Sykes, and an amusing note from E. A. Smith at the Brit. Mus. (Nat. Hist.) to Sykes in returning the book.

Lamarck: *Histoire naturelle des Animaux sans Vertèbres*—2d (Deshayes') edit., (1835–1845).

Set is the former property of Valenciennes, with his often copious marginal notes. Vol. 9 shown, open at *Voluta*.

A. A. Gould: *Descriptions of shells from the Gulf of California and the Pacific Coasts of Mexico and California*, (Boston, 1853).

Another western classic; author's presentation copy to Arthur Adams.

Lovell Reeve: *Land and freshwater mollusks of the British Isles*, (London, 1863).

Not at all a rare book, but this is an author's presentation copy to Sir

Richard Owen, the great anatomist. Subsequent owners (with autographs): A. S. Kennard and B. B. Woodward.

P. P. Carpenter: Original edition of the *Supplementary Report*, (London, 1864). Another classic. Author's presentation copy to S. P. Woodward; carries subsequent autograph of R. Boog Watson and vented bookplate of the Conchological Society.

Steinbeck and Ricketts: *Sea of Cortez*.

Autographed presentation copy to S.S.B. from both authors, with amusing but enigmatic sketch by J. S. May be unique.

B. W. Halstead: *Poisonous and Venomous Marine Animals*, vol. 1 (Washington, 1965).

This initial volume covers the history of the subject and the Invertebrata; author's presentation copy of this monumental and magnificently illustrated work.

SOME UNUSUAL MOLLUSKS, MAINLY PANAMIC

S. STILLMAN BERRY
Redlands, California

(ABSTRACT)

The talk concerned an exhibit of Panamic and other mollusks, principally selections from a remarkable array of bivalves collected by Mr. and Mrs. Ervin E. Wahrenbrock of the Yucaipa Shell Club during two seasons combing of some of the rich southern Mexican playas, a number of gastropods taken by Dr. Donald F. Abbott and the De Roy family in the Galápagos, and a few other items of interest.

The considerable series of *Pitar* (s.l.) included: *P. (Pitarrella) catharius* (Dall), much confused in collections with other species, and *P. (P.) mexicanus* Hertlein & Strong, from the Mazatlán trawlers; *P. (Lamelliconcha) unicolor* (Sby.) and *P. (Hysteroconcha) roseus* (Brod. & Sby.) from Playa Encantada, Guerrero, the former shown in both the usual brown or white forms, as well as some specimens with a beautiful variegation not ordinarily permitted to this species by the published descriptions; and from Playa Novillero, Nayarit, *P. (Lamelliconcha) vinaceus* (Olsson), together with fine growth-series of two of the most beautiful bivalves known, *P. (Hysteroconcha) lupanarius* (Lesson) and *P. (H.) multispinosus* (Sby.), demonstrating their complete specific distinctness, differing as they do in sculptural detail, size, weight, and color, besides the form, etc. of the spines. Other veneraceans represented were *Dosinia annae* Cpr. and *Cooperella panamensis* Olsson from Playa Encantada, Guerrero, and a fine complete example of the rarely seen *Clementia solida* Dall from the Mazatlán trawlers. A very large *Anodontia edentuloides* Verrill (long. 75 mm) was from the same source.

An interesting group of *Mactridae* from near the mouth of the Papagayo River, Guerrero, included growth series of the large *Mactrellona exoleta* (Gray), the same of bizarre *M. clisia* (Dall), and two examples of what were here taken to represent *M. subalata* (Mörch). The last has been united by Olsson with *M. alata* (Spengler), but these specimens show certain differences from the Caribbean shells which would seem to militate against their absolute union, at least until more comparative work has been done.

Galápagos shells exhibited included four species of *Cymatium*, one of which appears new to the eastern Pacific fauna. Also shown was a superb adult example of that queen of the genus, *Latirus tumens* Cpr. 1856, taken by Mr. and Mrs. Carl L. Shy while diving at Manzanillo, for which species there appears to exist only one published record other than that of the type; an array of west American borers of the genus *Pholadidea*, which included one more species than is accredited to us by recent reviews; and finally a curious example of *Megasurcula carpenteriana* (Gabb) from the San Pedro Sand (Pleist.) in which a large oval hole on the back has been completely repaired from within by a roughish fill carrying none of the normal sculpture.

NOTES ON NEPTUNEA

ROBERT R. TALMADGE

Eureka and Willow Creek, California

(ABSTRACT)

The genus *Neptunea* is well represented in the waters off northern California, where six distinct species occur. Collecting data indicates that the substratum is more important than depth, that there is considerable benthic tolerance, and that the species may or may not be rather inconsistent in shell characteristics. Some species show a remarkable similarity between individual specimens within a population, as well as between populations over an extended distribution. Other species show a remarkable similarity between individuals within a population, and a definite trend of intergradational shell features between populations, which alter the shell drastically between extreme localities of the distribution. Some species show a strong variation of shell features within a population, which may be repeated, or altered between close or even distant populations of what may be a single species. This last factor appears to be perhaps the most important, yet perhaps the least understood factor, due to lack of definite comparative material. The accompanying slides illustrate a number of such variations, both Recent and fossil.

WHY OPISTHOBRANCHS?

ANNE HURST

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(ABSTRACT)

Some reasons why opisthobranchs make good research animals were discussed and illustrated by recent research results. Opisthobranchs are soft-bodied and perform the functions of hard parts (such as maintenance of shape, protection, locomotion, implementation as for feeding) by other means. Shape is maintained by a fluid skeleton or haemocoel, also important in locomotion, and by protrusion of organs such as genitalia and feeding apparatus. The haemocoel is spacious, readily accessible and structurally complex. Its dynamics may be investigated by injection techniques: changing the fluid volume, measuring volume with added dyes, staining to determine blood routes

and structural boundaries, adding radio-opaque substances (e.g., Thorotrast, Brown, 1964) as a means of following fluid movements by X-ray photography. Pressure measurements of local areas of the haemocoel are becoming possible as hypodermics, tubing, transducers and measuring apparatus become smaller or more versatile. Opisthobranchs are very suitable mollusks for this type of study since many have no shells and change shape readily, having thick, muscular body walls and protrusible regions which are thin-walled and accessible. A sea slug may be considered as a muscular bag, but one with restricted compartments—reservoirs and haemal sacs (Hurst, 1965, 1967), channels and partitions, by which blood may be confined or directed. The ability to confine blood to a limited region and push it out of this area by muscular action enables sea slugs to protrude large structures quickly if necessary. Similarly, quick withdrawal is facilitated by the structure of the haemocoel, which can accommodate a large influx of returning blood and provides physiological valves to prevent backflow through blood vessels to the heart. Protrusible structures are vulnerable once protruded and quick withdrawal is advantageous. The haemocoel of *Philine* is adapted for protrusion and retraction of a large gut extrovert and changes in blood pressure are also important in operating the feeding apparatus (Hurst, 1965).

The gut extrovert of *Philine* is innervated and largely controlled by the buccal ganglia which initiate feeding movements. This action is inhibited by the cerebral ganglia. Study of such clear-cut functions is rewarding from several aspects. The brains of sea slugs have relatively few, large nerve cells, unlike those of higher animals which have many small ones. The simpler type of brain (with fewer cells) allows stereotyped, rather than variable, behavior patterns. There are fewer possible routes for impulses within the brain, thus although behavior patterns are limited, they are easily elicited and recognized. The large cells may be mapped and identified by their constant position in different specimens of the same species (Willows, 1965). Thus experiments are repeatable, and by electrical stimulation and recording excitatory and inhibitory nerves may be found and the positions of axons and synapses deduced. Individual cells (up to 100μ) may be stimulated or recorded from by the introduction of a glass microelectrode, and nerves may be similarly examined using chlorided silver hook or suction electrodes. Activity of both is monitored on an oscilloscope and gives interesting information on the control of behavior and the physiology of nerve cells (Chalazonitis, 1961, Dorsett, 1967, Hurst, 1967, Kennedy, 1967, Tauc, 1966, Willows, 1967).

Specific behavior patterns may also help in the identification of the larvae of opisthobranchs (Hurst, 1967), while further studies on the morphology of these stages and egg masses are also helpful (Davis, 1967, Hurst, 1967), but such details are infrequently included in descriptions of species. New species and records are still frequent in this group.

Opisthobranchs are thus especially suitable for studies of functioning. While information on their taxonomy is increasing, much more work is needed on their ecology, behavior and morphology at all stages of their life history. Their structure and organization are very suitable for experimental studies concerning the inter-relationships of internal fluid dynamics and neurophysiology, correlated with observed movements and behavior.

OBSERVATIONS ON *ROSENIA NIDORUM* (Pilsbry) AND
ARENE SOCORROENSIS (Strong)

DR. DONALD SHASKY
Redlands, California

(ABSTRACT)

Rosenia nidorum (Pilsbry, 1956), a parasite on the sea urchin *Eucidaris tribuloides* (Lamarck), was described from offshore Florida waters.

The Pacific analog of *Eucidaris tribuloides*, *E. thourasii* Valenciennes, has also been found parasitized by *Rosenia nidorum*. To date, specimens have been taken at María Madre Island, Tres Mariás; and Cabo Pulmo and Mulegé, Baja California.

The snail lives singly or in colonies in a cup-like depression in deformed spines of the urchin.

Although described as a *Mucronalia*, this shell seems closer to *Rosenia* Schepman, 1913.

Arene socorroensis (Strong, 1934) taken from both Socorro Island and Cabo Pulmo, Baja California, have been found to nestle their nepionic offspring within the umbilicus. Ten or more of the juveniles are frequently seen within the umbilicus of the parent.

SOME THOUGHTS ON THE WEST AMERICAN TELLINACEA

EUGENE COAN
Department of Biological Sciences, Stanford University, California

(ABSTRACT)

The Tellinacea of West America from Arctic Alaska to Isle de Cedros, Baja California comprise five families and about forty-six species. Type material of most of the pertinent species-level names has been studied and photographed, and most of the major collection have been reviewed. Preliminary conclusions on the relationships of the previously-proposed names and the distributions of supposed species are presented.

THE AMERICAN SPECIES OF THE GENUS *MORUM*
(Gastropoda: Tonnacea)

WILLIAM K. EMERSON
American Museum of Natural History

(ABSTRACT)

The distinctive cassid gastropods of the genus *Morum* are represented in the New World by six living species, four of which occur in the western Atlantic Ocean. One of the two eastern Pacific species is presently undescribed. Approximately 15 extinct species are known from the fossil record of the American Cenozoic, indicating a long history for the genus in the Western Hemisphere.

The genus first appears in the Eocene epoch of the American Caribbean and the European Mediterranean as cancellate sculptured forms that are re-

ferable to the subgenus *Cancellomorum*. By the close of the Miocene epoch, the European elements had become extinct, but the group by this time was essentially circumtropical in distribution with species also occurring in India, Indonesia, New Zealand, and Japan. The modern descendants of this group survived only in the warmer regions of the western and eastern Pacific Ocean and the western Atlantic Ocean. The strongly nodose forms of the nominate subgenus are not known in the New World until Pliocene time and are represented by species that are still living in the eastern Pacific and western Atlantic Oceans.

The Recent species of *Morum* in the New World may be classified as follows:

Genus *Morum* Röding, 1798

Subgenus *Morum* (*sensu stricto*)

Type species: *Morum purpureum* [= *M. oniscus* (Linné), 1767], by monotypy.

Synonyms: *Lambidium* Link, 1807, type species: *Lambidium oniscus* (Linné), 1767, by monotypy.

Oniscia Sowerby, 1824, type species: *Oniscia oniscus* (Linné), by tautonymy.

Ersina Gray, 1847, type species: *Strombus oniscus* Linné, 1767, by monotypy.

Plesioniscia Fischer, 1884, type species: *Oniscia tuberculosa* "Sowerby" Reeve, 1842, by monotypy.

Species:

1. *Morum* (*Morum*) *oniscus* (Linné), 1767, western Atlantic [Pliocene to Recent].

Synonyms: *Cypraea conoidea* Scopoli, 1786; *Morum purpureum* Röding, 1798; *Oniscia triseriata* Menke, 1830; *Oniscia lamarckii* Deshayes, 1844, not Lesson, 1840; *Morum floridana* Tucker and Wilson, 1933.

2. *Morum* (*Morum*) *tuberosum* "Sowerby" (Reeve), 1842, *ex* Sowerby ms., eastern Pacific [Pleistocene to Recent].

Synonym: *Morum xanthostoma* A. Adams, 1854.

Subgenus *Cancellomorum* Emerson and Old, 1963

Type species: *Morum grande* (A. Adams), 1855, by original designation.

Synonyms: "*Oniscidia* Swainson, 1840," *lapsus* for *Oniscia* Sowerby, 1824.

Onimusiro "Kira" Habe, 1964, *ex* Kira ms., type species: *Morum grande* (A. Adams, 1855), a replacement name for *Oniscidia*.

Species:

1. *Morum* (*Cancellomorum*) *dennisoni* (Reeve), 1842, western Atlantic.
2. *Morum* (*Cancellomorum*) *strombiformis* (Reeve), 1842, western Atlantic.
3. *Morum* (*Cancellomorum*) *matthewsi* Emerson, 1967, western Atlantic.
4. *Morum* (*Cancellomorum*) new species, eastern Pacific.

A PROGRESS REPORT ON THE STUDY OF FOSSIL AND RECENT
SPECIES OF THE CYMATIID GENUS *FUSITRITON* COSSMAN, 1903

JUDITH TERRY
Stanford University, Stanford, California

(ABSTRACT)

Eight species of *Fusitriton*, five or six of which appear to be distinct, occur in such widely separated localities as Japan, Alaska to California, southern South America, South Africa, New Zealand, and the Sub-Antarctic islands. Although the morphologic characters of the shells are similar and a close relationship is implied, neither fossil nor living specimens have been found between latitudes 30 North and 30 South.

The type species of the genus, *Fusitriton cancellatus* (Lamarck) occurs in South America and has a thin shell and subdued cancellate sculpture, appearing similar to the South African *Fusitriton murrayi* (E. A. Smith) [= *F. algonensis* Tomlin]. The "Hairy Oregon triton," *Fusitriton oregonensis* (Redfield) represents the genus in North America and Japan, and more sharply nodose forms, *Fusitriton galea* Kuroda and Habe and *Fusitriton laudandum* Finlay, are found in Japan and New Zealand, respectively.

The known fossil record of *Fusitriton* is scant to nonexistent in the southern hemisphere but quite well documented in North America. Taxonomic work based on incomplete or few specimens and a lack of appreciation for the variability in living material led early paleontologists to describe at least ten fossil species, of which four are probably distinct, from North America. Their geologic range is at least Miocene to Recent, subject to the evaluation of three Oligocene species having characters of both *Fusitriton* and *Argobuccinum*. Three Eocene forms may also be *Fusitriton* but have not been studied in sufficient numbers as yet.

Evidence from fossils and Recent shell morphology suggest that the genus evolved in western North America from a warm-water *Gyrineum* stock in the Eocene or earlier, spread to Japan by the Miocene and to the southern hemisphere relatively recently. Possible modes of dispersal include crawling along submarine ridges and swimming or being carried by currents in the larval state.

LATE PLEISTOCENE NONMARINE MOLLUSKS FROM THE STATE
OF PUEBLA, MEXICO

DWIGHT W. TAYLOR

(SUMMARY)

The first substantial assemblages of Pleistocene nonmarine mollusks from Mexico have been collected in the context of known geology, archeology, and other fossils, and are now dated by radiocarbon. Habitats and modern ranges of the species provide evidence of the latest Pleistocene-early Recent environmental changes at the south end of the Mexican Plateau. The alluvial formation known locally as Valsequillo gravel in the Puebla Valley, State of Puebla, about 70 mi SE of Mexico City, has yielded 32 terrestrial and aquatic mol-

luscan species, as well as extinct vertebrates, and artifacts that may be the earliest evidence of man in the New World (1).

Most of the fossil localities are in arroyos tributary to the Valsequillo Reservoir, 6-8 mi S of the city of Puebla. The composite molluscan fauna includes clams (Sphaeriidae, 5 species), freshwater prosobranch snails (2), freshwater pulmonate snails (11), and terrestrial pulmonates (14). None of the species is extinct, but several are known living only at considerable distances.

The most detailed stratigraphic information comes from the arroyo "Baranca de Caulapan." Fossil shells come from 5 successive horizons in Valsequillo gravel; 4 collections have been dated by radiocarbon (2); and an artifact was associated at one locality. The species characteristic of perennial fresh water are mostly found in the lower and coarser part of the section, and the few species from the highest locality are practically all tolerant of seasonal fluctuation. Hence, during deposition of the alluvium, stream flow changed from perennial about 20,000 years ago to markedly seasonal (perhaps even intermittent) by about 9,000 years ago.

The known ranges of 3 land snails in the lower part of the Caulapan section are far to the north, but possibly they will be found living at high altitudes nearby, such as on the volcanoes around Puebla Valley. *Cionella lubrica* (Müller) is known in Mexico only from the northern Sierra Madre Oriental near Galeana, Nuevo Leon (elevation not recorded, 425 mi NW of Puebla) and from the northern Sierra Madre Occidental of northwestern Chihuahua (elevations of nearly 6,000 feet and higher, over 1,000 mi NW) (3). The nearest occurrence of *Pupilla blandi* Morse is in the mountains of southwestern New Mexico, over 1,100 mi NW (4), and of *Vertigo ovata* Say in the Huachuca Mts., SE Arizona, over 1,100 mi NW (4). Although these distances should be appraised with caution, considerable shifts in distribution (vertically or laterally) are evident. Range extensions of the same order of magnitude apply to the aquatic species *Bakerilymnaea cockerelli* (Pilsbry & Ferriss), *Fossaria dalli* (Baker), and *F. modicella* (Say), not known previously in Mexico (5). *Gyraulus parvus* (Say) has been recorded only once previously on the Plateau of Mexico, in the State of Morelos (6), and hence that occurrence may represent a southern disjunct range. These exotic, generally northern species imply that summer climate near Puebla was cooler, until some time between about 9,000 and 20,000 years ago. By about 9,000 years ago the climate was like that of the present except for being slightly wetter.

The climatic change inferred from the sequence of faunal changes in Baranca de Caulapan agrees with the glacial-postglacial transition as known in the more thoroughly studied southern Great Plains of the United States (7, 8). In both areas older, more diverse assemblages indicating moister and cooler climate, and including markedly extralimital species, change to poorer assemblages that are similar to the modern fauna and lack exotic forms.

More ecological data, and the more precise age interpretations dependent on them, will require substantial field studies of the living fauna of Puebla Valley and vicinity. Proximity of the high volcanoes Popocatepetl and Ixtaccihuatl to the area offers hope of matching modern life zones with the stratigraphic record (9).

REFERENCES AND NOTES

1. Fossils were collected by H. E. Malde (U.S. Geological Survey), who studied the geology, and by C. E. Ray (U.S. National Museum), who is studying the fossil

vertebrates. The research has been supported by the National Science Foundation and American Philosophical Society, and is under the general direction of J. O. Brew, Director, Peabody Museum of Archaeology and Ethnology, Harvard University. Publications on the archeology and geology of the Valsequillo area are by Cynthia Irwin-Williams, in "The problem of Pleistocene extinction" (Yale Univ. Press, 1967), and by H. E. Malde and others (Science, in preparation).

2. U.S. Geological Survey laboratory; sample W-1898, > 35,000 years B.P.; W-1975, > 29,000 B.P.; W-1895, 21,850 \pm 850 B.P.; W-1896, 9,150 \pm 500 B.P.
3. H. A. Pilsbry, Proc. Acad. Nat. Sci. Phila. **105**, 165 (1953).
4. H. A. Pilsbry, Mon. Acad. Nat. Sci. Phila. **3** (2), 931, 953 (1948).
5. *B. cockerelli* has not been recorded closer than New Mexico and Texas (reference 7). *F. modicella* is known widely over the United States to southern Texas (F. C. Baker, Chicago Acad. Sci. Spec. Publ. **3**, 263, 1911). Possibly the record of "*Limnaea desidiosa* Say" from Saltillo, Coahuila (H. A. Pilsbry, Proc. Acad. Nat. Sci. Phila. **54**, 777, 1904)—the only sure occurrence of any *Fossaria* in Mexico—is based on this species. If so, the range extension amounts to only about 475 miles southward.
6. E. von Martens, Biologia Centrali-Americana, Land and freshwater Mollusca (London, Zoological Society, 1890-1901, p. 394).
7. C. W. Hibbard and D. W. Taylor, Contr. Mus. Paleont. Univ. Mich. **16**, 1 (1960).
8. B. B. Miller, Malacologia **4**, 173 (1966). D. W. Taylor in H. E. Wright, Jr. and D. G. Frey, The Quaternary of the United States (Princeton Univ. Press, N.J., 1965), p. 597-611, and references therein.
9. Illustrations and discussion of the mollusks will appear in a paper by D. W. Taylor and W. B. Miller to be submitted to *The Veliger*.

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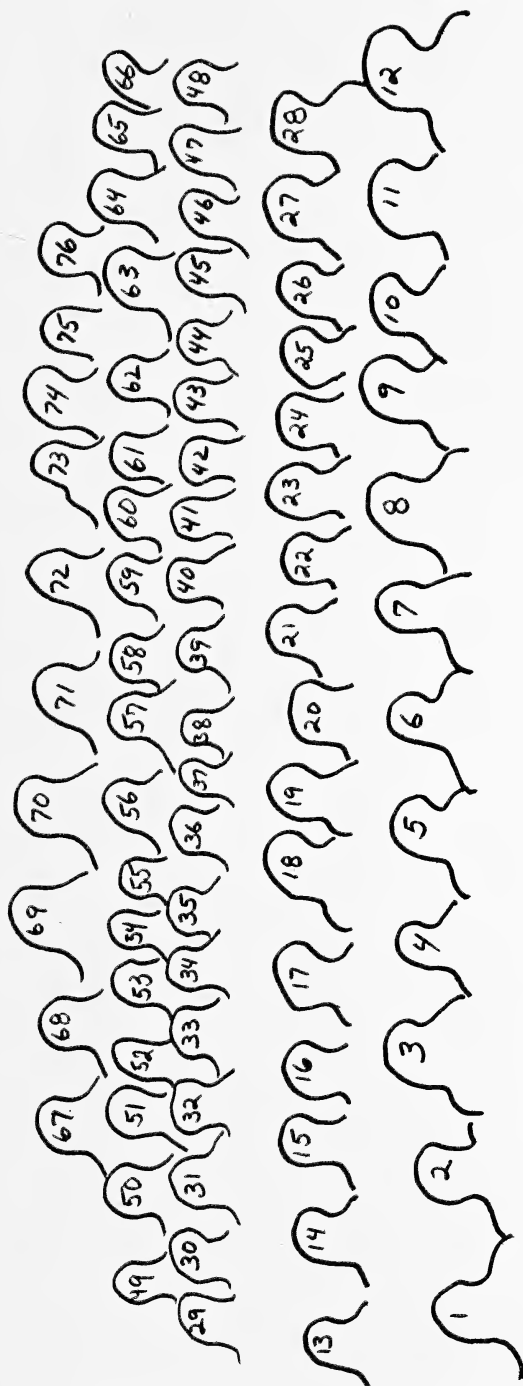
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Mr. and Mrs. Fred Berg, Santa Barbara, California
Dr. S. Stillman Berry, Redlands, California
Mrs. Priscilla Blesch, Burlingame, California
Mr. and Mrs. Ford Bratcher, Hollywood, California
Mrs. Ondine Brohaska, Fresno, California
Mr. and Mrs. John Q. Burch, Seal Beach, California
Dr. and Mrs. Thomas A. Burch, Phoenix, Arizona
Mr. and Mrs. Glenn Burghardt, San Leandro, California
Mr. Donald B. Cadien, San Pedro, California
Dr. Bruce Campbell, Lynwood, California
Mr. and Mrs. Crawford Cate, Los Angeles, California
Mr. and Mrs. Emery P. Chace, Lomita, California
Mr. Eugene Coan, Palo Alto, California
Mr. and Mrs. Phillip Crane, San Gregorio, California
Mrs. Salle Crittenden, Alameda, California
Mrs. Auda Davis, Healdsburg, California
Miss Joan Demond, Los Angeles, California
Mr. and Mrs. Joseph DuShane, Whittier, California
Dr. William K. Emerson, New York City, New York
Mr. Walter J. Eyerdam, Seattle, Washington
Mr. and Mrs. Wesley Farmer, San Diego, California
Mrs. Ruth French, Lomita, California
Mr. and Mrs. William Gemmell, San Felipe, Baja California, Mexico
Mrs. Barbara Good, San Diego, California
Mrs. Winogene Goodwin, Berkeley, California
Mrs. Kay Gudnason, Oakland, California
Col. and Mrs. George Hanselman, San Diego, California
Miss Betsy Harrison, Honolulu, Hawaii
Mrs. Faye B. Howard, Santa Barbara, California
Mrs. Bernadine Hughes, Los Alamitos, California
The Reverend Elwood Hunter, Yachats, Oregon
Dr. Anne Hurst, Reading, Berkshire, England
Dr. A. Myra Keen, Stanford, California
Dr. Vida Carmen Kenk, San Jose, California
Hazel Kolb, Healdsburg, California
Miss Mary E. Long, Sonora, California
Dr. James H. McLean, Los Angeles, California
Captain Walter B. Miller, Tucson, Arizona
Mrs. Charlene Neeb, San Diego, California
Mrs. Mae Dean Richart, San Francisco, California
Mr. and Mrs. Barry Roth, San Francisco, California
Mr. Frank D. Russ, Alameda, California



AMERICAN MALACOLOGICAL UNION, PACIFIC DIVISION
Twentieth Annual Meeting



1. Hazel Kolb, 2. Dr. Rudolf Stohler, 3. Dr. Bruce Campbell, 4. George Hanselman, 5. Virginia Hanselman, 6. Gale Sphon, 7. Helen DuShane, 8. Joseph DuShane, 9. Dr. Myra Keen, 10. Dr. Dwight Taylor, 11. Evelyn Wilson, 12. Emery Chace, 13. Dr. Anne Hurst, 14. Salle Crittenden, 15. Kay Gudnason, 16. Ruth French, 17. Vera Wegner, 18. Jean Cate, 19. Faye Howard, 20. Mary Long, 21. Elsie Chace, 22. Mae Dean Richard, 23. Gladys Archard, 24. Fay Wolfson, 25. Dr. Vida Kenk, 26. Audra Davis, 27. Ondine Brohaska, 28. Mrs. E. E. Wahrenbrock, 29. Leslie Roth, 30. Joan Demond, 31. Nelson Baker, 32. Twila Bratcher, 33. Judith Terry, 34. Ruth Shasky, 35. Joyce Gemmell, 36. Diana Wait, 37. Barbara Good, 38. Kay Webb, 39. Matie Wiard, 40. Winogen Goodwin, 41. Laura Burghardt, 42. Mrs. Fred Berg, 43. Mrs. Thomas Burch, 44. Rose Burch, 45. Gail Avery, 46. Mrs. Joseph Bequaert, 47. Bernadine Hughes, 48. Michaelene Farmer, 49. Dr. Joseph Bequaert, 50. Dr. Donald Shasky, 51. Dr. S. Stillman Berry, 52. Walter Miller, 53. E. E. Wahrenbrock, 54. Eugene Coan, 55. Keith Cox, 56. Crawford Cate, 57. William Gemmell, 58. Frank Russ, 59. Lawrence Thomas, 60. Fred Berg, 61. Wesley Farmer, 62. Dr. Thomas Burch, 63. John Q. Burch, 64. Glenn Burghardt, 65. Elizabeth Harrison, 66. Mary Jo Woolsey, 67. Robert Talmadge, 68. Allyn G. Smith, 69. Ray Summers, 70. Barry Roth, 71. Dr. James McLean, 72. Dr. William K. Emerson, 73. Donald B. Cadien, 74. Walter Eyerdam, 75. Elwood Hunter, 76. Ford Bratcher.

Dr. and Mrs. Donald Shasky, Redlands, California
 Mr. Allyn G. Smith, Berkeley, California
 Mr. Gale G. Sphon, Jr., Santa Barbara, California
 Miss Joan Emily Steinberg, San Francisco, California
 Dr. Rudolf Stohler, Berkeley, California
 Mr. Ray Summers, Petaluma, California
 Mr. Robert R. Talmadge, Willow Creek, California
 Dr. Dwight W. Taylor, Phoenix, Arizona
 Miss Judith Terry, Stanford, California
 Mr. Lawrence Thomas, Morro Bay, California
 Mr. Spencer Thorpe, El Cerrito, California
 Mr. and Mrs. E. E. Wahrenbrock, Calimesa, California
 Mrs. Diana Wait, Fresno, California
 Mrs. Kay Webb, Chula Vista, California
 Mrs. Verna Wegner, El Cerrito, California
 Mrs. Matie Wiard, Oakland, California
 Miss Evelyn C. Wilson, Oakland, California
 Mrs. Fay H. Wolfson, La Jolla, California
 Miss Mary Jo Woolsey, Los Angeles, California

AMERICAN MALACOLOGICAL UNION, INC.

Financial Operations (P. & L.) Statement for Year 1966

INCOME:

Membership Dues Collected		\$2,140.20
Life Membership		300.00
A.M.U.P.D. Assessment Collected	\$ 77.50	
A.M.U.P.D. Assessment Paid Out	77.50	
Sales of Annual Report		51.50
Interest on Savings Account		169.05
Donation from No. Carolina Shell Club		575.01
Miscellaneous Income		15.00

How to Collect Shells

Sales of H.T.C.S.	1,097.85
Advertising Income	496.00
	<u>\$1,593.85</u>

Expense:

Printing	\$1,236.90	
Postage	64.55	
Insurance	48.00	
Advertising	5.00	
Telephone	4.45	1,358.90
Net from H.T.C.S.		<u>234.95</u>

TOTAL INCOME \$3,485.71

GENERAL EXPENSES:

Printing Annual Report	\$1,730.21	
Printing, Stationery & Office Supplies	256.57	
Postage	187.48	
Adding Machine Rental	131.60	
Travel Expense to Convention—Sec'y	223.29	
Tel & Tel	36.05	
Contribution	10.00	
Bank Charges	1.60	
P. O. Box Rental	6.70	
TOTAL EXPENSE		\$2,583.50
NET GAIN FOR 1966		\$ 902.21

Statement of Financial Condition as of December 31, 1966

ASSETS:

Cash in Hibernia Bank—San Francisco	\$1,301.94	
Cash in Brentwood Savings & Loan— Savings A/C		
Life Membership Fund	\$1,330.88	
Unallocated Funds	1,909.15	
		3,240.03
Secretaries Revolving Fund		50.00
Cash Received by 1967 Treasurer		
Advance	100.00	
Donation from No. Carolina Shell Club	365.01	465.01
TOTAL ASSETS		\$5,056.98

NET WORTH

Net Worth January 1, 1966	\$4,154.77	
Gain During 1966	902.21	
Net Worth December 31, 1966		\$5,056.98

Respectfully submitted, Mae Dean Richart
(Treasurer, American Malacological Union, Inc.)

Audited, Russell H. Archerd

NOTES, NEWS, NOTICES

The 1968 annual meeting of the American Malacological Union will be held July 15-19 at Corpus Christi, Texas. At that time six Texas shell clubs will share the duties of co-host; upon acceptance of their cordial invitation these clubs went into immediate action, planning the promised Texas style convention. Details of rates, facilities and featured attractions will be furnished AMU members early in 1968, and all are urged to attend. Pacific Division members especially should not miss the opportunity of getting together with their eastern colleagues since the usual geographical barrier will be greatly reduced.

The twenty-first annual meeting of the AMU, Pacific Division will be held June 19-21 at Asilomar, Pacific Grove, California. Meeting notices will be mailed to all members well in advance of the event but those wishing earlier information may contact the secretary, Barbara J. Good, 3142 Larga Court, San Diego, California 92110.

* * *

Two rare shells were featured at the recent Ottawa meeting. A cut of *Pyrulofusus deformis* Reeve graced the program cover; it is a large (to four inches) sinistral marine snail, thin for its size, occurring in boreal waters. Few specimens are in private collections.

The other, *Thracia conradi* Couthouy is a curious marine bivalve whose right valve is always punctured by the beak of the left. Until recently this species was extremely rare, then it was collected in quantity by Mr. Martin Thomas of the Fisheries Board of Canada at Malpeque Bay, Prince Edward Island. (See Nautilus, Vol. 80, p. 84-87.) The perfect specimens given as place favors at the AMU annual dinner were unique and valued souvenirs of a memorable occasion.

* * *

Not only did North Carolina send the largest number of representatives to the Ottawa meeting, they brought along a massive scrapbook that received almost constant attention as it occupied a table in the lounge. Compiled by Mrs. Kenneth Johnson, it holds a variety of letters, clippings and other objects that chronicle in great detail the 1966 AMU meeting at Chapel Hill. Enconced therein for posterity is even one of the natty Scotch bonnets (headgear, not the shell) that graced the banquet.

* * *

Collectors are reminded that the Pittsburgh Shell Club acts as clearing house for persons desiring to exchange correspondence or shells outside the United States. For the latest list of would-be foreign exchangees send self addressed stamped envelope or 10¢ to Mrs. June Snyder, 716 King St., McKeesport, Pennsylvania 15132.

* * *

DATES OF THE AMU ANNUAL REPORTS—Report for 1961 was mailed on December 12, 1961; 1962 on December 21, 1962; 1963 on January 1, 1964; 1964 on December 14, 1964; 1965 on February 22, 1966; 1966 on February 28, 1967. (Dates compiled and submitted by Allen Press, Lawrence, Kansas.)

SHELL CLUBS AFFILIATED WITH THE AMERICAN MALACOLOGICAL UNION

BROWARD SHELL CLUB, Mary Palmer, Corresponding Secretary: The Broward Shell Club meets the second Wednesday of every month at 8:00 P.M. at the Atlantic Federal Savings and Loan Association Community Room, 1750 East Sunrise Boulevard, Ft. Lauderdale, Florida. A cordial invitation is extended to all visitors.

Guest speakers Dorothy and Norman Jensen of Long Island, N.Y., presented a film named "Pink Sands of Eleuthera." Mr. R. H. Gore, III, a marine biologist showed slides and gave a very educational account of undersea life and rare shells obtained while on an oceanographic research vessel in the Atlantic Ocean. Club members Mrs. Jean Redding and Mr. Earl Chesler taught us much about shelling in Panama with slides and shell specimens found there. Mr. Don Lea, a veteran diver, displayed beautiful films of underwater sea life, shelling and diving in Bahamian waters. Mr. William E. Old showed slides of rare shells and Mrs. Terry Marsh told of her experiences at the AMU meeting in Chapel Hill, N.C.

The highlight of planned shellhunts was the flight by members to Abaco, one of the out-islands in the Bahamas. A wonderful week-end was spent at Treasure Cay shelling in the vicinity with profitable results.

The third annual shell show was most successful. The judges were: Mr. William E. Old, Jr., Dept. of Mollusks, American Museum of Natural History, N.Y.; Mrs. Germaine Warmke, Marine Science Dept. at the University of Florida, and Mr. and Mrs. Harvey Meyer from Captiva Island. Mrs. William Ross of Ft. Lauderdale assisted Mrs. Meyer in judging the shellcraft division.

The Broward Shell Club and The South Florida Shell Club joined forces for a most enjoyable shell bazaar where members were fortunate to see and obtain beautiful and rare shells.

The *Busycon Bugle*, a monthly publication edited in the form of a newsletter, is sent to members prior to each meeting and has proven to be an excellent medium to exchange information, education and experiences.

Officers for the current year: President, Mr. Lee Robinson; Treasurer, Mrs. Mary Lou Stoner; Recording Secretary, Mrs. Betty Stapleton; Corresponding Secretary, Mrs. Mary Palmer; Appointments Program Chairman, Mr. Earl Chesler; Shell Show Chairman, Mrs. Mary Lou Ingalls; Publicity Chairman, Mrs. Mary Lou Ingalls; Hospitality and Membership Chairman, Mrs. Jean Redding; Shell Hunt Co-Chairman, Mr. Bill Chapman and Mr. Jim Ingalls; Bylaws Chairman, Mrs. Ruth Chesler; Scrapbook Chairman, Mrs. Mary Lou Ingalls; Editor of *Busycon Bugle*, Mrs. Eva Burkard; Shell Raffle Chairman, Mr. Bill Chapman; Librarian, Mrs. Mary Lou Stoner.

CHICAGO SHELL CLUB, Mrs. Alice Burke, Corresponding Secretary: Three years old in 1967, the club meets on the second Sunday of each month, September through June, at 2:00 P.M. at the Field Museum of Natural History, Lake Shore Drive and Roosevelt Road, Chicago, Illinois 60605.

Officers for 1967 are: Mr. Albert J. Lindar, President; Mr. Thomas D. Burke, Jr., Vice-President; Mrs. Allen Swenson, Treasurer; Mrs. Albert J. Lindar, Recording Secretary; Mrs. Thomas D. Burke, Jr., Corresponding

Secretary; Miss Helen Yast, Librarian; Mr. Stanley Dvorak, Director; Dr. Henry G. Wehringer, Director; and Dr. John R. Lewis, Director.

One of the outstanding highlights of the 1966-67 program was the club's "St. Nick and Neptune" Christmas party, featuring cocktails and dinner, door and raffle prizes, a "fishing pond" grab bag, plus a silent auction. Shells for the auction were donated by members; in addition, President Lindar had arranged for delivery of a wide array of Japanese shells while on a Pacific collecting trip.

Mr. Chester Gould, creator of the "Dick Tracy" comic strip, graciously created and donated an illustration for the cover of the club's Molluscan Cook Book, which members received as the club's Christmas present.

Another successful silent auction highlighted the June meeting, this time of a special shipment of Philippine shells arranged for by President Lindar.

Assembled from the collections of club members, the Third Annual Shell Fair (non-competitive) was on display during the entire month of March at Chicago's Field Museum of Natural History.

Speakers for the season included: Loren Woods, Curator of Fishes, Field Museum of Natural History, on his participation in the U.S. Biological Program of International Indian Ocean Expeditions; Dr. Alan Solem, Curator of Lower Invertebrates, Field Museum of Natural History, on changes in shells' names; club member Mrs. Betty Lou Girardi, on non-molluscan marine invertebrates; Mr. Vince Corcoran, Director of Special Events for the Metropolitan Chicago Y.M.C.A. SCUBA Diving Council, on the British Honduras reefs; Professor Robert L. Scranton, Professor of Classical Art and Archeology, University of Chicago, on the joint University of Chicago and Indiana University underwater explorations at Kenchreai, Greece; and Club President Albert J. Lindar, on a recent shell-collecting tour in the Pacific.

Films, such as Walt Disney's "Mysteries of the Deep," "The Colorful Cuttle," and "The Octopus," were also featured in the club's program.

The club also continued its reviews of the six classes of mollusks, an educational series of lectures and illustrated texts begun last year.

COASTAL BEND SHELL CLUB, Lorine Weaver, President: These were our past year's activities: in October (1966), a night bay collecting trip which was a flop but fun; December, the annual Christmas party; March, Fifth Annual Shell Fair; April, daytime bay collecting trip; June, backyard fish fry; July, annual beach picnic; August, a field trip to Port Aransas, snorkling at jetty rocks.

Our projects: (1) induce the AMU to come to Texas for the 1968 convention; (2) raise funds for same, through sale of chances for water color painting of shells by our member, Mrs. Jean Wasson; (3) shoe-box collections of our common species, 100 boxes, 50 shells per box, to be sent by Corpus Christi Museum to public schools upon request; (4) considerable enlargement of our club library; (5) growth; seven family and three individual members were added over the past year.

Various members, as individuals, have guest-lectured at public schools and for organizations such as the Camp Fire Girls and Girl Scouts.

WE LOOK FORWARD TO SEEING YOU IN 1968.

CONCHOLOGICAL CLUB OF SOUTHERN CALIFORNIA, John E. Fitch, Recording Secretary: A typical evening with the CCSC, which meets at 7:30 P.M. the first Monday of each month in the Lounge of the Los Angeles County Museum, includes a short business meeting, reports on field trips which various members have enjoyed since the previous meeting, discussion of the evening's shell displays, a program from our guest speaker, and door prize drawings. Prior to our May, 1967 meeting, adjournment would see most of the membership depart for home, but effective May 1, an innovation in the form of refreshments (coffee and cookies) was successfully launched. Now, when the meeting adjourns around 9:00 P.M., dues are paid, recent literature is perused, displays are leisurely examined, and the room literally resounds with friendly chatter as various members' prize-winning cookies are consumed in great quantities.

Our organization takes great pride in its *Lost Operculum Club*. To become a member, one simply has to submit for measurement a Pacific Coast mollusk that is larger than any previously measured shell of the same species. If the species hasn't been submitted by anyone else you're a shoo-in winner, but competition for the largest entry usually is very stiff. At present, "giants" of some 400 species are on the books, but any or all of these can be shot down by future entries.

Most members have collections, and most will collect locally and in the Gulf of California during the year. Each season, however, a few members try greener pastures. During the past year some traveled to Florida, the Bahamas, Puerto Rico, and other choice Caribbean spots, and several reached Hawaii, but only one couple appears to have reached Australia, the Philippines, and similar richly-endowed shelling paradises in the South Pacific.

Our club concluded another successful year in June, 1967 by hosting the best yet AMUPD meeting at Asilomar.

Officers: President, Crawford N. Cate; Vice-President, James H. McLean; Recording Secretary, John E. Fitch; Corresponding Secretary, Forrest Poorman; Treasurer, James H. McLean; Editors, Jean M. Cate, Martha Dippell.

CONCHOLOGICAL SECTION, BUFFALO SOCIETY OF NATURAL SCIENCES, Ellen Holdway, Secretary: The past year saw changes, new members and the loss of a very valued one, Dr. Paul E. Peters whose paper, "Pronunciation of Scientific Names" was published in February, 1966; he died in April, 1967.

Our year started in September with a tribute to our late president, Mr. Morley Bishop, and to our oldest member, the late Eugene Schmeck. At this meeting the club thanked Mrs. Lester Greene and Mrs. Paul Peters for the excellent exhibit which they had set up at the Erie County Fair. Mr. Damon Holmes talked of the bitterling fish, mussels and their service to one another.

October was banquet time, and Dr. and Mrs. John Storr of the University of Buffalo told of an underwater trip to the coral reefs of the Bahamas. In November we learned more of the five classes of mollusks from Mrs. Stanley Bearss, and in January installed the following officers: Mrs. Joseph Wandyez, President; Mrs. Paul Peters, Vice-President; Miss Louise Becker, Treasurer; Mrs. Ellen Holdway, Secretary. Remainder of the evening was given over to a talk on Limpets by Mrs. Leslie Potter.

In February Professor Edward J. Buehler took as his interesting subject, "Noah's Ark to Isotopes"; and on through the spring months we enjoyed a panel on the identification and classification of mollusks (Mrs. Vincent Valone, Mr. and Mrs. Stanley Bearss, Reverend A. Leslie Potter with Mrs. Peters as moderator); a discussion of shellcraft by Mrs. Lester Greene and Mr. Joseph Dobmeier; "People to People via Shells," Mrs. Ethel Bishop; papers on the lives of Linnaeus and of Lamarck by Mr. Eugene Musial and Miss Louise Becker; and for our June meeting, "Expeditions of Conchological Interest" by Mr. Lester Greene. A most enjoyable year, highlighted by an exhibit of shells in the Buffalo Museum of Science for three weeks in May.

CONNECTICUT VALLEY SHELL CLUB, Helen B. Burt, President: For the past two years we have increased our membership, developed many new interests in the field of conchology, and made happy contacts with fellow shell collectors all over the world. We are a small club of 43 members (six honorary) all very interested and enthusiastic. Our 1967-68 officers: President, Helen B. Burt; Vice-President, Earl H. Reed; Treasurer, Charles T. Bingham; Program Chairman, Mary Roberts. We meet the second Monday of each month at 7:30 P.M. in the Lapidary Room of the Springfield (Massachusetts) Museum of Natural History.

The year's program commenced in June, 1966 with an illustrated talk by Austin and Ruth Warren on shelling in Mexico. Percy and Dorothy Meyer were hosts for our annual picnic that was a shelling trip to Big Pond in Otis, Mass. In August we met at the new home of Earl and Alcine Reed for an outdoor basket lunch and in September enjoyed a photo accounting of a rugged trip to Guadeloupe, Dominica and Martinique by Henry and Nellie Dow. The November meeting was devoted to a talk by Earl Reed, "Shells of Lake Tanganyika and Other Unusual Shells."

December featured a gift-laden Christmas tree, refreshments and slides of club activities since 1959; it was interesting to note progress and how much more knowledgeable we had become. We began the New Year with a joint lecture by Henry and Nellie Dow, Austin and Ruth Warren, and Robert and Eli Ley on shelling in Georgia and Florida. "Famous Shell Collections and Shell Rarities" by Earl Reed made us realize how old shell collecting is, and Dr. William Clench of the Museum of Comparative Zoology at Harvard spoke on the economic importance of mollusks.

In April we planned the shell exhibit to be displayed in the Richard Storrs Library in Longmeadow, and cold wet May was made bright by the talk made by Austin and Ruth Warren in their home, "Repeat Performance of Bonaire and Puerto Rico." We were proud to hear that one of our members, Mrs. Hildur Wallensten had taken a third at the St. Petersburg Shell Show for her South African shells.

Highlight of our year came when we were again invited to present a slide lecture on mollusks to patients at the Shriners' Hospital for Crippled Children. Mr. and Mrs. Austin Warren, Mrs. Constance Glassanos and Mrs. Helen B. Burt represented the club on this occasion, presenting a collection of one hundred shells to the school. Each year the club plans to add to this collection. I end this report with a quote from one of the patient's thank-you letters: "I got goofed up on the Latin names of the shells but I sure learned how pretty they are and what kind of things they can do. Why, they are almost human!"

FORT MYERS SHELL CLUB, Mrs. LaVerne Weddle, President: Our Club was organized in November, 1962 and has more than 80 members. We meet the first Monday night of each month the year around, and all visiting collectors will be most cordially welcomed.

The main event of the year is always our Shell Show held in February as an activity of the Edison Pageant of Light, the biggest annual community project of Fort Myers. More than 6,000 people visited our 1967 show which was open for 5 days.

In June 17 club members made a 4-day trip to the Florida Keys with very satisfactory results.

Officers elected for the 1967-68 year are: Mrs. LaVerne Weddle, President; Myles Jackson, Vice-President; Mrs. Mary Hartman, Secretary; and Mrs. Carolyn Whatley, Treasurer. Directors-at-Large are: Mrs. Millie Oberlin, Mrs. Loretta Iler, Mrs. Gladys Clark and Mrs. Bernice Lescalleet, immediate Past President.

GREATER ST. LOUIS SHELL CLUB, Nancy Remmert, Recording Secretary: The year 1966-67 has been very rewarding in that we now have a Junior Division that gives promise of great things to come. They are very enthusiastic and have elected their own officers and will plan their own programs. Off to a good start, they had their own Shell Show with forty-eight entrants and fifty-three exhibits. They meet the first Sunday afternoon of each month, September through June, at the Museum of Science and Natural History.

Our own meetings are usually held at 7:30 on the second Wednesday of the month in members' homes. Visitors are always welcome. If interested in visiting, contact the Museum of Science and Natural History, Oak Knoll Park, Clayton, Missouri, 63105 (Parkview 6-2888). They will put you in touch with one of our officers.

The programs were varied this past year with papers on *Strombus*, *Caecum*, "Shells from Far Away Places with Strange Sounding Names," Dredgings, "Critters of the Sea," films and a field trip in July for fresh water shell collecting.

Our officers for the coming year: President, William Neuman; Vice-President-Treasurer, Freida Schilling; Historian, Al DuRocher; Recording Secretary, Nancy Remmert; Corresponding Secretary, Violet Hertweck.

GULF COAST SHELL CLUB, Grace Broussard, Secretary: Among others, our club accomplished the following sixteen things over the past year: (1) brought our bank balance to \$554.12; (2) held three field trips to the Coast; (3) counted over 100 regular and associate club members; (4) sent our publication "Between the Tides" to ninety persons each month; (5) revised our Constitution and Bylaws; (6) donated shells for Braille kits; (7) donated shells for youth museum at Brazosport, Texas; (8) donated shells to schools in Colorado and Kansas; (9) voted to place shells in East Texas Museum in Woodville, Texas; (10) voted to urge state representatives to vote for *Tellina tayloriana* to become Texas' state shell; (11) voted \$100 now (and more later) to bring the AMU to Texas; (12) decorated a large Christmas tree in Port Arthur with shells; (13) held a very successful shell auction; (14) sold shells and food at South Texas Fair to finance annual Gulf Coast Shell Show; (15) bought new

books and pamphlets for our growing library; (16) enjoyed many good programs at our meetings!

Our officers: Edna Lamb, President; Grace Broussard, Secretary; Ralph Burch, Treasurer; Program Chairman, Viki Bishop; Editor, Anna Mae Bishop; Circulation Manager, Grace Varnado.

HOUSTON CONCHOLOGY CLUB, Mrs. David A. Dashiell, Corresponding Secretary: The club meets on the fourth Wednesday of each month from August through May at 7:30 P.M. at the Southwest Service Center.

Other officers are: Chairman, Laurence N. Dexter; Vice-Chairman, Tom L. Kister; Program Chairman, Dr. Wataru W. Sutow; Recording Secretary and Treasurer, Mrs. J. M. Fennessey; Editor, Dr. Helmer Odé; Professional Consultant, Dr. T. E. Pulley.

Our programs include illustrated talks, workshops, and beachcombing trips to coastal areas. We have had an opportunity to learn about shelling in the Marshall Islands this year since one of our members, Ernest Libby, now lives there and another, Dr. Wataru Sutow, makes periodic trips to the islands.

We publish the "Texas Conchologist," a monthly bulletin devoted to membership activities and scientific information concerning shells. Plans for next year include publication of some photographs of Texas shells for which no good illustrations are available.

The club's second shell show was well received. It included many beautiful and interesting displays and a fascinating exhibit of live mollusks, crabs, and anemones.

Some of our members are cooperating with the Houston Museum of Natural Science and the Galveston Office of the Bureau of Commercial Fisheries in a population survey of mollusks of the Texas area. Plans call for dredging up to 1000 fathoms. The work of identifying and listing the shells is progressing well under the expert leadership of Harold Geis and Dr. Helmer Odé.

THE INTERNATIONAL LEAGUE FOR YOUNG SHELL COLLECTORS, Edgar Bauer, Exec.: The ILYSC was organized by Edgar Bauer and Steven J. Britz. Its purpose is to encourage greater interest in the study of shells among young people; to provide information and literature on shells; to encourage exchanging of shells and ideas internationally; and to furnish vocational advice to those interested in malacology as a career. Professional advisors are: Drs. R. Tucker Abbott, William J. Clench, Kenneth Boss and Mr. Morris K. Jacobson, U.S.A., and Bro. Mark Ross, S.M., Peru, S.A. As there can be no meetings, members have contact through their mimeographed paper, **THE YOUNG SHELL COLLECTOR'S QUARTERLY**. The **QUARTERLY**'S staff includes Edgar Bauer, editor and publisher, Lima, Peru; Steven J. Britz, Treasurer, Watertown, Mass.; Patrick Anseeuw (European Division), Courtrai, Belgium; and Mrs. Edwin S. Hicks, 7170 Lucky Drive, W., Jacksonville, Florida 32208, Public Relations. (Volume I, No. 1 of the **Quarterly** is dated August, 1967.) We welcome all inquiries.

JACKSONVILLE SHELL CLUB, Grace L. Kapp, Secretary: Our club meets the fourth Thursday of each month at the Arlington Federal Savings and Loan building in Jacksonville at 8:00 P.M. Of course we welcome all visitors.

1967 officers: President, Mace Stephens; 1st Vice-President, Maggi Wheldon; 2nd Vice-President, Harry Webb; 3rd Vice-President, Ellie Macedonia; Treasurer, Paul Shoen; Secretary-Librarian, Grace Kapp.

Our 1966 shell show was very well attended and received many favorable comments for the beautiful exhibits. Later we placed a shell exhibit in the University Library case and still later another in their entrance archway.

We have had several successful expeditions so far this year; more are being planned. The 1967 shell show will be held July 28-30 in the new Community Center at Jacksonville Beach.

LONG BEACH SHELL CLUB, Bernadine E. Hughes, President: Our club meets the second Sunday of each month (except July) at 2:00 P.M. at 600 Long Beach Boulevard, Long Beach, California. Visitors are cordially welcomed.

Officers for 1966-67 are: President, Mrs. Bernadine Hughes; Vice-President, Mrs. Fred Mucke; Recording Secretary, Mrs. Emmeline Miller; Corresponding Secretary, Miss Winnifred Wogg; Treasurer, Miss Frances Bellman; Librarian, Mr. S. Ralph Hall; Historian, Mrs. Claude Lehman.

We are now rounding out our 29th year of consecutive operation. Each year several months are taken up with the annual events, Swap Meet and potluck dinner in April, auction and potluck in August and the Christmas dinner and gift exchange in December. We have monthly field trips which vary widely, according to season and tides. Each meeting has time set aside for study; this year we concentrated on Families.

In April, as usual, we filled a double booth at the World's Largest Hobby Show, held in our local Municipal Auditorium. Our door-buster meeting was the "Other Hobby" when all members were invited to display their second hobby; response was so overwhelming that even in a good-sized hall we very soon ran out of space.

Mr. and Mrs. E. W. Ulrich took "traveling" honors with a shelling trip around the world; their program and display at the March meeting were outstanding. Another interesting program was that of Mr. Burt Draper of Los Angeles who specializes in very miniature shells, some requiring a 25 power magnifier to see. In most cases these were adult shells in perfect condition. Heaven forbid you should drop one!

Through donation and purchase our club library is rapidly outgrowing its allotted space, which is both a problem and a happy situation.

LOWER KEYS SHELL CLUB, INC., Ann Young, President: Early in 1967 the idea of a shell club in the lower Florida Keys was conceived and discussed by several interested persons, chief of whom was Mrs. Wylda Stephens who was transferred away from the Keys before the club became a reality.

A shell fair was planned and held on April 1 and 2, with the excellent cooperation of the Chamber of Commerce of the city of Key West; it was attended by some 500 persons and grossed over \$600; after that the club was organized and now has 62 adult and 3 junior members. A charter has been drawn and applied for.

Future plans include a second annual shell fair and field and study meetings on such topics as will be decided by the membership. Held in the exciting area of Key West with its unexcelled marine life the years to come promise rich rewards.

MIAMI MALACOLOGICAL SOCIETY, Ellen Crovo, Secretary: This introduces a newly formed group whose primary function is to promote study of the various species of mollusks, their lives and environments. Also we hope to offer assistance to others by providing educational displays, information, etc., in this way to bring to public notice a little known but interesting group of animals. We are interested in conservation and preservation of areas where mollusks may breed and live successfully.

Our officers will welcome hearing from anyone who would like further information about us: President, Lt. Col. Corinne E. Edwards, Box 691, Coconut Grove Station, Miami, Florida 33133; Vice-President-Secretary, Mrs. L. E. Crovo, 2915 S.W. 102 Avenue, Miami, Florida 33165; Treasurer, Mrs. E. W. Futch, 144 W. 32 Street, Hialeah, Florida 33031; Editor-Historian, John A. Baker, Box 171, Biscayne Annex, Miami, Florida 33152.

CODE OF ETHICS FOR MEMBERS

WE, THE MEMBERS OF THE "MIAMI MALACOLOGICAL SOCIETY"

1. Do recognize that each living thing is linked to many others in nature's chain of life and will strive to maintain this balance of nature by word of mouth and any available expedient, as well as by our own example.
2. Will collect only what we need for our collections, trading and worthwhile purposes. We will not collect to sell.
3. Will turn back rocks and leave areas as we found them; replace juvenile and non-specimen mollusks and marine life for propagation; tell others why we do so that they too may be encouraged to do the same.
4. Will be available to help fellow members and scientific groups when needed, requested and able.
5. Will share our knowledge, books, discoveries and places to observe and collect specimens with those who will use the information in the interest of conservation and reasonable collecting.
6. Will do our best to properly identify, and correctly label with location data and scientific name, our own specimens before coming to meetings for further discussion and study.
7. Will be prepared to make observations for scientific purposes and will, while collecting and observing, keep accurate data on everything pertinent, noting the area, number, condition, food, enemies and activities of the mollusks and marine life. Dependable and accurate information is vital if we are to assist students of malacology, scientists, and scientific groups.
8. Will be ready to make small exhibits for temporary placement, for short periods of time, in public places such as schools, libraries, and museums, as requested, in order to promote interest and knowledge of our Florida mollusks and associated life. Exhibits should show something of interest about the shells or sea life, should be explanatory and the largest part should be actual material rather than too much wording or pictures.

NAPLES (FLORIDA) SHELL CLUB, Lou Mason: Visitors to this part of the Everglades are invited to attend our meetings held on the third Thursday, October through May at the Woman's Club Auditorium in Naples. Officers are: President, Lillian Carey; Vice-President, Louise Berlin; Recording Secre-

tary, Kathleen Richardson; Corresponding Secretary, Lena Cartwright; Treasurer, J. Richey Horner; Historian, Virginia Magee.

This past year we had just started our club publication NAPLES SHELL NEWS, when tragedy struck; our beloved editor William (Bill) Cole passed away suddenly from a heart attack. We dedicated our 1966 shell show and remaining issues of the paper to his memory.

Our shell shows are always stimulating, entertaining and educational; this was no exception. Judges were Dr. Donald Moore of the University of Miami and Mrs. Elsie Malone of Sanibel Island. They awarded SHELL OF THE SHOW award to our fellow club member Dr. Eugene Wightman for his violet spider conch, *Lambis violacea*, an exquisite and rare shell from the Indian Ocean. Dates for the 1968 show are February 23 through 25 at the Woman's Club Auditorium; don't miss it.

Glowing accounts of the 1966 meeting of the AMU at Chapel Hill, N.C. were given by our bearded fellow member who was lucky enough to attend. On other occasions we enjoyed speakers, slides and films. We seem to have difficulty in organizing field trips; usually the weather is horrendous and the shelling great; shellers being a hardy breed we have managed to survive.

NEW YORK SHELL CLUB, INC., Angela Savino, Recording Secretary: New York Shell Club meetings are held at the American Museum of Natural History, convening at 2:00 P.M. on the second Sunday of the month, September through June. Exceptions: the meetings of April and May, 1968, will be held on the first Sundays. As of January, 1967, membership totaled 294: 206 regular, 76 corresponding, one life and one honorary member. Officers elected in June are: President, Mansfield Fuldner; Vice-President, Milton Werner; Treasurer, Mathilde Weingartner; Recording Secretary, Angela Savino; Corresponding Secretary, Grace McDougall. Mrs. Selma Feinberg is again serving as Librarian, and Nick Katsaras as Historian. Dorothy Raeihle continues as editor of the *New York Shell Club Notes*, assisted by Anthony D'Attilio and Karl Jacobson. Correspondence concerning the Notes should be addressed to Mrs. Raeihle at 7924 Ankener Ave., Elmhurst, N.Y. 11373.

Guest speakers at meetings through the past year, and their subjects were: Dr. Ruth Turner of the Museum of Comparative Zoology, Teredinidae; Charles A. Lewis, Director of Outdoor and Conservation Education, School Districts of North Hempstead, N.Y., student conservation projects under federal grant; Dr. Kenneth Boss, MCZ, Tellinidae; Sidney Anderson, skin diving off New Providence Island, Colombia; Russell Jensen, Garden State Shell Club, collecting in Bermuda (illustrated with his underwater motion pictures of live mollusks). Among club members who made presentations describing collecting trips were: Mrs. Orville Davis, Taiwan; Dorothy Germer, Gulf of California; Frances and Waverley Harmon, South Africa; Stanley Sokoloff, India; Karl Jacobson, Canada's tundra. Marian Schroth made a presentation on ecology, Harold Feinberg on *Liguus*, Nick Katsaras on *Marginella*, Karl Jacobson on understanding synonymy, Neal Seamon on shells of Hawaii, and Dorothy Raeihle on observations of captive *Murex cellulusus*.

The year's activities included a social meeting in place of the regular meeting in April. It featured an auction of shells donated by members and friends, and a buffet supper. The club's annual field trip was held on June 3, to

coincide with an early afternoon low tide in Long Beach Bay, Orient Beach State Park, on the northeastern tip of Long Island. The air temperature was ideal; the water temperature was 58°.

THE NORTHERN CALIFORNIA MALACOOZOLOGICAL CLUB, Glenn E. Burghardt, President: A very active year has just passed. The first shell show in the history of the club was held last October followed in December by a very enthusiastic Christmas Party. The show was so successful that the members are looking forward to one in the fall of 1967. Beginning the first of this year there has been a member get-together each month in addition to the regular meetings. These events have been in the form of an open house to view a member's collection or a collecting trip to a local area. These get-togethers have been very well attended. The programs have been spread over many subjects: "Shell Collecting in the Trust Territories" (lecture), "Visit to New Guinea" (lecture and slides), "Skin Diving in Monterey" (slides), "Mollusks" (movies), "Shell Identification Meeting," "Haliotis species" (lecture with specimens). The officers for 1967 are: Glenn Burghardt, President; John Saxby, Vice-President; William Keeler, Recording Secretary; Murrid Herring, Corresponding Secretary; Laura Burghardt, Membership Secretary; Matie Wiard, Treasurer; Rudolph Stohler, Executive Secretary; Tom Yancy, Librarian; Salle Crittenden, Past President. Meetings are held the first Tuesday of each month (except July) in Life Sciences Building, University of California, Berkeley, California (room 4005).

NORTH CAROLINA SHELL CLUB, Ruth S. Dixon, Secretary: The Club has had a very interesting year under the leadership of its new president, Mr. Wade Gillis Brown. The membership has increased from 252 to 287 members, 20 of these additions being made at the AMU meeting in Chapel Hill. There have been four meetings in 1966-67: Fall meeting in October at Wrightsville Beach; December meeting, inland as in the past, at the State Museum of Natural History in Raleigh; March meeting at Myrtle Beach, South Carolina, and May meeting at Atlantic Beach, North Carolina. The beach meetings have been week-end affairs starting on Friday evening and lasting until Sunday with a full planned program including a field trip and a lovely banquet on Saturday evening. The December meeting was a one-day occasion.

The meetings have featured both scientific and informed topical speakers. The club members are greatly indebted to Dr. John Ferguson and Dr. Jack Upchurch, Dr. Ferguson for his informative talks on "Shells and How They Got That Way," and his outlined classification of Mollusca with typical families, genera, genotypes, popular names, and locality. Copies were distributed to each member present. We are grateful to Dr. Upchurch for his beautiful slides used to illustrate Dr. Ferguson's talks. He spent a great deal of time and money in making these for the members' enjoyment. It was the wish of the club for Dr. Ferguson to begin again with Dr. Abbot's book in planning his Workshops on Shell Classification. Other speakers have been Mr. Hugh J. Porter who spoke on "Problems in Identification of Northern and Southern Quahogs," and Dr. Brauer, Director, and his associates from the Bio-Medical Research Center at Wrightsville Beach where the October meeting was held.

Mrs. Charlotte Johnson, Past President shared her experiences shelling at Rickenbacker Causeway at Miami Beach. Dr. Robert J. Menzies, Director of Duke University Oceanographic Program spoke on his investigations on the genus *Neoplina* belonging to the very primitive molluscan class, Monoplacophora. Dr. Ferguson took the members on "Further Adventures to Hawaii and Australia" via beautiful colored slides and his interesting narration. One of the projects of the year has been planning a group trip by chartered bus to Sanibel Island. It has taken about a year to settle on an appropriate date agreeable to all. It has been decided that 1968 will be the earliest time the club can arrange to make this trip. Therefore the time for planning and dreaming has been extended.

The greatest moment in the history of the North Carolina Shell Club was hosting the AMU meeting in Chapel Hill in August, 1966. The club members were gratified to see that their efforts were not in vain. Due to close budgeting and donated materials and services we were able to send two checks to Margaret Teskey for the AMU Treasury.

The AMU meeting at Chapel Hill proved to be a delightful success. While the N.C. Shell Club members knocked themselves out in trying to be good hosts, the success of the meeting was due to the presence of many wonderful people from 25 states, Canada and the Virgin Islands.

Our club also has a quarterly publication edited by the club secretary and also an Annual Bulletin.

The 1967-68 officers are: President, Mr. Wade Gillis Brown; Vice-President, Mr. Hugh J. Porter; Secretary, Mrs. Ruth S. Dixon; Treasurer, Mrs. Elizabeth T. Mathews; Historian, Mrs. Charlotte Johnson; and Executive Committee Members-at-Large, Mr. Harry Davis and Dr. John Ferguson.

PITTSBURGH SHELL CLUB, Mrs. June Snyder, Corresponding Secretary: Our club, now in its third year, meets the first Saturday of the month, October through June, at 2:00 P.M. at Mellon Bank, Fifth Avenue and Craig Street, Pittsburgh, Pa.

A highlight of the past year was having Dr. William J. Clench as the speaker for our second anniversary meeting. He was made our first honorary member. At this meeting our first shell show was held and our second Shell Club Bulletin was distributed. Other programs included "How the Prehistoric Indians of Southwestern Pennsylvania Made Use of Shells," Donald Tanner; "Brachiopods and Marine Invertebrates of the Antarctic," Sister Maurice Whalen; "The Restless Sea," Bell Telephone Co.; "Geographic Distribution of Mollusks in the Western Hemisphere," Dr. Juan J. Parodiz; "Linne's Contribution to Molluscan Classification," Mrs. Bonnie Oatis; "How to Catalog Shells," Mrs. Karen Vander Ven; "Methods of Cleaning Shells," Louis Dietrich.

Some of the other features were our annual Christmas shell sale, a fossil field trip, and the establishment of a club library.

Current officers are: President, Mrs. Gladys McCallum; Vice-President, Mr. Norman Franke; Secretary of Records, Miss Sharon Snyder; Secretary of Correspondence, Mrs. June Snyder; Treasurer, Mrs. Esther Parodiz; Counselor, Dr. Juan J. Parodiz.

ROCHESTER SHELL AND SHORE CLUB, Marjorie Brenneman, Secretary: Meetings held fourth Wednesday of each month, September to June except November and December (a banquet is held on the first Wednesday in December) at 8:00 P.M. at the Charlotte Branch of the Rochester Public Library, 3612 Lake Avenue, Rochester, New York.

We started our new year with a trip to the Niagara Falls Aquarium where we enjoyed viewing live coral, sponge, echinoderms and mollusks. A profit from our June shell auction enabled us to add several good books to our circulating library.

September found us again setting up an exhibit of shells in the 7' x 11' window of the Rochester Gas and Electric Corporation on busy East Avenue. In October, Richard Grau gave us a fascinating talk on "The Geometric Aspects of Mollusca." Our field trip to Leicester, New York for Devonian fossils yielded few fossils but a bounty of happy fellowship. Member Dr. Eugene Wightman brought honor to our club by winning blue and red ribbons at the Florida Shell Shows.

We are proud of the volunteer work done by our officers to stimulate interest in shells. Elinor Abendroth gave talks to fourth grade pupils in the schools of Greece; Marjorie Brenneman taught shell craft in the Day Care Center for Handicapped Children, and Berniece Plummer lectured to groups at the Rochester Association for the Blind and in the science classes of the New York State School for the Blind. Shell-a-rama kits, provided by the club, which included tray of 15 shells, shell book transcribed in braille, and recording "Sound of the Sea" were also presented. President Berniece Plummer made a large placard of shells for the emotionally disturbed children in the State Hospital in Rochester. Our shell charts are still circulating in the Rochester city and town schools. More work for the Blind and Crippled Children and Retarded Children is planned in the future.

Officers for 1967-68: President, Mrs. Berniece Plummer; Vice-President, Mrs. Karl Abendroth; Treasurer, Mr. James Barton; Recording Secretary, Mr. Melvin Meyer; Corresponding Secretary, Mrs. James Barton, 20 Newfield Drive, Rochester, New York 14616.

ST. PETERSBURG SHELL CLUB, Virginia S. Anderson, Corresponding Secretary: The club held its meetings at the Florida Presbyterian College in St. Petersburg on the second and fourth Friday of each month beginning in October and continuing through April.

At the first meeting of the club, Mrs. Virginia S. Anderson was elected Corresponding Secretary to complete the term for which Mrs. Marilyn S. Gordon had been elected in the spring. Our beloved Marilyn met an untimely death in June and is greatly missed by all.

The programs presented were: "Shelling in the 4th Dimension," a talk on fossils by Rev. Lisle B. Caldwell; a meeting at the St. Petersburg Science Center, followed by a tour of the building and glimpse of science projects of students; a color movie taken by our 1966 President, Robert Lipe, "Shells and Shellers"; "Florida Turbans and Tops" on color slides with commentary by Dan Steger; Color Slide Travelog "Shelling on Bonaire" by Selma Lawson. The annual Christmas party and shell exchange was enjoyed by all. William Lyons, of Florida State Board of Conservation, presented "Project Hourglass,"

a marine biological research program in the Gulf. Color Movies on "Mollusks" from Indiana University Film Library were enjoyed at one meeting, while a surprise movie involving birds and their rhythmic dancing put to music entertained the group at another meeting. Pat Torrance gave a very interesting commentary on "Shelling Vacations." Members had fun identifying shells in slides borrowed from Dan Steger's collection. "Echoes of the Shell Show" by Dan Steger brought back memories of prior shows, as well as the 1967 show which featured a grandfather clock made primarily of shells in its moving parts. This meeting included election of officers for 1967-68 season.

We are very proud of the work done by Emma and Dorothy Hanssler and the educational committee in their project of sending educational shell collections to various schools throughout the country, which have requested them. Sixty-seven sets have been sent, fifty-one since the first of the year.

Nine field trips were held at seven locations. Attendance was very good and members were pleased with their find.

The 20th Annual Shell Show was held at the Treasure Island Auditorium March 23rd through March 27, 1967. The judges were: William E. Old, Jr., Mrs. John Oberle, and Major George D. Robinson.

Winner of the Smithsonian Institution Award was Mrs. Mariam W. Schriener for her interesting display of "Fossil and Recent Shells." V. Roger Dunn won the Shell of the Show Award with a beautiful specimen of *Spondylus varius* Sowerby. Ribbons in 13 other categories were also awarded.

Officers: President, Mrs. Selma Lawson; Vice-President, J. Arch Mellor; Treasurer, William R. Reader; Recording Secretary, Dorothy Hanssler; Corresponding Secretary, Florence Kuczynski; Librarian, Patricia Torrance; Directors-at-Large, V. Roger Dunn, Kittie Westfall.

SAN ANTONIO SHELL CLUB, Bessie G. Goethel, Past President: Our group consists of 40 active adult members, 10 junior members, 23 corresponding members, four honorary members, and six institutions. We meet every fourth Monday night and our programs consist of films, slides and shell displays.

Once each year we enjoy a picnic and shell trading session, and whenever we have an out-of-town guest speaker we have a dinner and provide a public hall so that others than members may enjoy the lecture. We encourage our junior members to participate in all activities and they are urged to prepare and read a five minute paper on the subject of their choice.

Once each month, on Sunday, there is a meeting in a member's home where we study one particular species, also bringing along shells needing identification. We have at least three field trips each year, to the coast, or a river or sometimes for fossils. We exhibit once each year at the Fort Sam Houston Hobby Show, sometimes at other fairs or shows; our success is attested by the fact that our members have won over 75 ribbons! Three of our members have acted as judges at shell shows in other cities. We publish a quarterly paper, "Texas Shell News."

Our members help the museum staff set up displays and we have placed a traveling display with the public school system. We continue to grow and to learn.

SANIBEL-CAPTIVA SHELL CLUB, Maude Meyer: The club meets the first Monday evening of the months from November through April, alternating the meetings between Captiva and Sanibel. Due to illness, the meetings were cut to four this year beginning in January.

January was an informal series of brief reports from members on their shelling activities during the summer with displays of their "finds." February brought Mary D'Aiuto from St. Petersburg for a requested repeat showing of her slides of live mollusks and her delightful comments on the trials and tribulations of gathering, feeding and photographing her charges. March was an Australian night with the Barrier Reef film from the Australian Legation and a second bought by Mr. William Stevenson from the Tourist Bureau which many of us thought did more justice to the beautiful colors of the corals on the reef. Both contained excellent strips on turtle hatching. A shell door prize was awarded at each meeting. All were attended by a number of visiting shell club members from many parts of the country.

Our Conservation Booklet is still being distributed and well received. The April meeting was the usual dinner with reports and election of officers. Elected were: Mrs. Mary Aleck, President; Harvey G. Meyer, 1st Vice-President; Mrs. J. C. McCaul, 2nd Vice-President; Mrs. H. K. Jeremiassen, Recording Secretary; Mrs. Donal Reese, Corresponding Secretary; Mrs. Arthur Swanson, Treasurer.

SOUTH FLORIDA SHELL CLUB, Gloria Durfey, Recording Secretary: A LIVE LEFT HANDED *Conus floridanus* Gabb. collected at Marco by Leonard and Norma Carlson highlights our report. Don and Mary Lou Franks were awarded highest honors at two shell shows, winning the Philadelphia Academy of Natural Sciences award at our sixth annual shell show with their thirty-one foot exhibit of Florida Shells and the American Museum of Natural History perpetual cup at the Broward Show with a twenty foot exhibit of Florida Gastropoda. Not to be outdone by his parents, Master Rick Franks won the Florida Shell of the Show Plaque with his live collected ten inch *Melongena corona* Gmel. Programs were varied and ranged from "Housing and Cataloging Our Shells" by Terry Marsh to "Cymatiums," "Shelling the Coral Reefs of Australia," "A Trip to the Hawaiian Islands" and "Fresh Water Snails and Their Economic Importance." Our programs culminated with "Shells of Puerto Rico" by Mrs. Germaine Warmke. We had field trips to Port Salerno, Bahia Honda, local waters and the Bahamas. We're proud to report that Rita Sturgeon was re-elected president. Other officers: Vice-President, Fran Hutchings; Recording Secretary, Gloria Durfey; Corresponding Secretary, Norris McElya; Treasurer, Evelyn Lewis; Editor, Marge Schafer; Historian, Mary Lou Franks. Meetings: Fourth Wednesday each month at the Museum of Science, 3280 South Miami Avenue, Miami, Florida. Send all correspondence to above address.

THE SOUTHWEST FLORIDA CONCHOLOGIST SOCIETY, Helen E. Peck, Publicity Chairman: We were chartered as of October 10, 1967 with 115 charter members. One month later our group numbered 140. Our officers are: Helen Denny, President; Larry Harner, Vice-President; Carolyn Lowry, Recording Secretary; Sylvia Horner, Corresponding Secretary; Miriam

McDonald, Treasurer; Barbara Clark, Hospitality Chairman; Renee Grove, Librarian; Harold Gregory, Sargeant at Arms; Helen Peck, Publicity Chairman. Meetings are held the second Tuesday of each month at the Lee County Coop, Inc., Bayshore Road, North Fort Myers, Florida.

Three successful field trips were held during the October low tides, to Key West, Lover's Key and Bonita Causeway. Many members had never hunted live shells before and were delighted with results.

YUCAIPA, CALIFORNIA SHELL CLUB, Mrs. Arylene Baylies, Secretary. Officers for 1967: President Kate St. Jean was replaced by Vice-President, Mr. Robert Wallar when Mrs. St. Jean moved away from the area. Secretary, Mrs. Arylene Baylies; Treasurer, Mr. Howard Fletcher; Program Chairman, Mrs. Stella Barron. Meetings are held the *third* Sunday of each month, except August, at 2:00 P.M., at the Mousley Museum, Bryant Street and Panorama Drive, Yucaipa.

Again this year three couples from our group spent several months in Mexico collecting hundreds of shells, some of them very rare, some still unnamed. The couples share their shells, experiences, pictures and ideas at meetings during the year. Field trips to our coast included one to White Point and one to Doheny State Park, both during minus tides.

Speakers and their subjects during this year have been: Mr. and Mrs. Robert Hall of the Long Beach Shell Club who illustrated methods of exchanging shells from around the world, and some of the by-products of shell trading. A new member in our club, Brian Williams from Chile, gave illustrated talks on Peru, his former home; he has shells from Peru and Easter Island.

Mr. Ed Fisher of Redlands: "One Man's Garden" beautiful colored slides showing what this one man found in his own yard at various seasons during the year; Mr. Don Cadien of San Pedro, "Nudibranchs" and related shell-less animals. Live specimens, sketches and colored pictures made this a real treat. Mr. Roy Poorman of Pasadena, illustrated how to "Take a Picture" using the reverse lens method to take close-ups, greatly enlarging tiny shells to expose all their detail and beauty.

One of the outstanding programs was a sound motion picture in color, "Coral Wonderland" which was obtained through the Australian Embassy by the owner of our local museum, Mr. Louis Mousley. This was a real treat to those of us who have never seen these fascinating reefs with their teeming sea life.

Other activities included the annual pot luck picnic at the Mousley Oak Tree Retreat, and the Christmas party with delicious food and shell exchange

The following clubs are also affiliates of the AMU: Boston Malacological Club, Galveston Shell Club, Guam Shell Club, Hawaiian Malacological Society, National Capital Shell Club, Oregon Shell Club, Pacific Northwest Shell Club, Pacific Shell Club, Palm Beach County Shell Club, Philadelphia Shell Club, Sacramento Valley Conchological Society, San Diego Shell Club, Santa Barbara Malacological Society, Sarasota Shell Club, South Padre Island Shell Club.

IN MEMORIAM

William H. Cole

Theodore F. Endres

Mead French

Dr. Paul E. Peters

Margaret M. Teare

Harriet W. Thomson

ACTIVE MEMBERS

Membership List Revised November 30, 1967

* Pacific Division member

- Abbott, Dr. and Mrs. R. Tucker, Dept. of Mollusks, The Academy of Natural Sciences of Philadelphia, 19th and The Parkway, Philadelphia, Penn. 19103.
- Adams, Lawson, 2100 S. Bay St., Milwaukee, Wisc. 53207. (Amateur.)
- Aguayo, Dr. Carlos G., College of Agriculture, Mayaguez, Puerto Rico 00709.
- Akers, Mrs. Frank G., 455 Australia Ave., Palm Beach, Fla. 33480. (Fine shells.)
- Albert, Mrs. Ernest, 1413 Browning St., Clearwater, Fla. 33516.
- Aldrich, Dr. Frederick A., Marine Sciences Research Lab., Memorial Univ., St. Johns, Newfoundland, Canada. (Decapod cephalopods.)
- Alexander, Robt. C., 423 Warwick Rd., Wynnewood, Penn. 19096.
- Allen, Dr. J. Frances, 6000 42nd Ave., #311, Hyattsville, Md. 20781
- Allen, Mr. and Mrs. Lawrence K., Box 822, Pt. Isabel, Texas 78578. (*Murex*, *Pecten*; world marine.)
- Allen, Miss Letha S., 187 Argyle St., Yarmouth, Nova Scotia, Canada. (Mollusks in general.)
- *Allison, Dr. Edwin C., 1420 Henry St., Berkeley, Calif. 94709. (Fossil, Recent & mega-micro marine invertebrates.)
- Anders, Kirk W., Shells of the Seas, Inc., P.O. Box 68, Kissimmee, Fla. 32741 (Volutidae; all rare shells.)
- Anderson, C. J., 648 Keller Rd., Berwyn, Penn. 19312
- *Archerd, Mrs. Russell, 1133 Spruce St., Berkeley, Calif. 94703
- *Arnold, Ben E., Rt. 5, Box 27, Port Orchard, Wash. 98366. (Tropical and semi-tropical marines.)
- Aslakson, Capt. Carl I., 5707 Wilson Lane, Bethesda, Md. 20034. (World marine.)
- Athearn, Herbert D., Rt. 5, Box 376, Cleveland, Tenn. 37311. (Freshwater mollusks.)
- Athearn, Mrs. Roy C., 5105 N. Main St., Fall River, Mass. 02720. (Land shells.)
- Auerbach, Stuart, 1710 Algonquin Trail, Maitland, Fla. 32751
- *Avery, Mrs. Rada Gail, 1823 N. 40th St., Phoenix, Ariz. 85008. (Shells of N. America; exch.)
- *Baily, Dr. Joshua L., P.O. Box 1891, La Jolla, Calif. 92038.
- Bain, Bonnie Alison, Box 128, Rt. 2, Sault Ste. Marie, Mich. 49783.
- Baker, Mrs. A. W., Box 715, Valdeese, N. C. 28690
- Baker, Emmett B., 7 Riverview Ave., Kingston, Mass. 02364. (General interest.)
- Baker, Dr. and Mrs. Horace B., 11 Chelton Rd., Havertown, Penn. 19083.
- Baker, John A., P.O. Box 171, Biscayne Annex, Miami, Fla. 33152. (General interest.)
- *Baker, Nelson W., 279 Sherwood Dr., Santa Barbara, Calif. 93105. (General interest.)
- Barlow, Alice Denison, 5 Downey Drive, Tenafly, N.J. 07670.
- Becker, Albert F., 2157 Sunrise Dr., La Crosse, Wis. 54602. (Mississippi River shells.)
- Becker, Miss Louise W., 2 Lexington Ave., Buffalo, N. Y. 14222.
- Bedell, Adele Koto, 2643 Laundale Dr., Beloit, Wisc. 53511.
- Bedford, Charles A., Gen. Del., Roberts Creek, British Columbia, Canada.
- Beetle, Mrs. Dorothy, Peninsular Junior Nature Museum, J. Clyde Morris Blvd., Newport News, Va. 23601 (Land and freshwater world shells).
- Behrens, Grace, 222 Lenox Rd., Apt. 6-F, Brooklyn, N. Y. 11226. (Abalone; starfish.)
- Bell, Lt. James H., 5227 Ridgedale Ave., Dallas, Texas 75206

- Bennett, Mr. and Mrs. C. G., 640 73rd St., Ocean, Marathon, Fla. 33050 (*Murex*)
- *Bequaert, Dr. Joseph C., Dept. of Entomology, Univ. of Ariz., Tucson, Ariz. 85717.
- Berg, Mrs. Frederick C., Box 115, Georgetown, Md. 21930. (Shells of the Florida Keys.)
- Berry, Dr. and Mrs. Elmer G., 1336 Bird Rd., Ann Arbor, Mich. 48103.
- *Berry, Dr. S. Stillman, 1145 W. Highland Ave., Redlands, Calif. 92373.
- Beyea, Barbara, 70 Washington St., Salem, Mass. 01970.
- Bickel, David, Dept. Geology, Ohio State Univ., 125 S. Oval Dr., Columbus, Ohio 43210. (Systematics and ecology of freshwater mollusca.)
- Bijur, Jerome M., 135 7th Ave. N., Naples, Fla. 33940. (Buy, exch. Florida marine.)
- Bippus, Mr. and Mrs. Alvin C., 2743 Sagamore Rd., Toledo, Ohio 43606. (Marine gastropods.)
- Blaine, Mr. and Mrs. Alger P., 237 19th Ave. S., St. Petersburg, Fla. 33705.
- Blanchard, Adrian G., 802 E. Main St., New Port Richey, Fla. 33552. (All shells, Recent and fossil.)
- Bleich, Henry, P.O. Box 598, Dania, Fla. 33004.
- Blinn, Dr. Walter C., Dept. Nat. Sci., Michigan State Univ., E. Lansing, Mich. 48823. (Ecology, behavior of land snails.)
- *Bonus, Mrs. Warren, 26418 Marine View Dr., Kent, Wash. 98031 (All shells)
- Boss, Dr. Kenneth, Museum Comp. Zool., Cambridge, Mass. 02138
- Boyd, Dr. and Mrs. Eugene S., 295 Gillis Rd., Victor, N. Y. 14564. (Phylum Mollusca, all aspects.)
- Bradfield, Mrs. Jesse, 339 Mt. Alto, Rome, Ga. 30163. (General interest.)
- Bradley, J. Chester, 604 Highland Rd., Ithaca, N.Y. 14850.
- Bradley, John C., 469 Farmington Ave., Waterbury, Conn. 06710. (Travel and collect.)
- Branson, Branley A., P.O. Box 50, Eastern Ky. Univ., Richmond, Ky. 40475
- *Bratcher, Twila L., 8121 Mulholland Terr., Hollywood, Calif. 90046.
- Brooks, Mr. and Mrs. John C., 1112 Pine Ave., Ft. Pierce, Fla. 33450
- *Brown, Dorothy, 2535 Loring St., Pacific Beach, San Diego, Calif. 92109. (Pectens.)
- Brown, Dr. and Mrs. Harvey E., 9455 S. W. 81st Ave., Miami, Fla. 33156.
- Brown, Wade G., 1317 Arnette Ave., Durham, N. C. 27707
- Brown, Mrs. Ward, 1420 N. Lakeside Dr., Lake Worth, Fla. 33460.
- Broyles, Dr. and Mrs. Ralph E., 5701 Fairfield Dr., Ft. Wayne, Ind. 46807.
- *Brunson, Dr. Royal Bruce, Montana State Univ., Missoula, Mont. 59801
- *Bryan, Edwin H., Jr., Bishop Museum, Honolulu, Hawaii 96819. (Pacific biogeography and bibliography.)
- Bullis, Harvey, Jr., Bureau Comm. Fisheries, Pascagoula, Miss. 39567.
- *Burbridge, Mrs. Harry, 2216 S. 212th, Seattle, Washington. 98100 (Classifying collection)
- Burch, Dr. John B., Museum of Zool., Univ. of Mich., Ann Arbor, Mich. 48104. (Land and freshwater mollusks.)
- **Burch, Mr. and Mrs. John Q., 1300 Mayfield Rd., Apt. 61-L, Seal Beach, Calif. 90740
- *Burch, Dr. and Mrs. Thos., 914 W. Palm Lane, Phoenix, Ariz. 85007. (Dredging.)
- Bureau of Commercial Fisheries, Biological Laboratory, Oxford, Md. 21654
- Burgers, Dr. and Mrs. J. M., 4622 Knox Rd., Apt. 7, College Park, Md. 20740.
- *Burghardt, Glenn, 14453 Nassau Rd., San Leandro, Calif. 94577.
- Burke, Alice L. and Thos. D., Jr., 1820 S. Austin Blvd., Cicero, Ill. 60650. (Marine mollusks of eastern U. S. A.)

- *Cadien, Don, 1006 37th St., San Pedro, Calif. 90731.
- *Campbell, Dr. G. Bruce, 11221 Elm St., Lynwood, Calif. 90268. (Typhiinae, Terebri-
dae, E. Pacific.)
- *Campbell, R. W., 5536 Hardwick St., Burnaby 2, British Columbia, Canada.
(Pacific Coast marine and terrestrial gastropods; exch.)
- Cann, Mrs. Ruth L., Massachusetts Ave., Boxboro RFD, Acton, Mass. 01720. (Ma-
rine shells; coll. and exch.)
- Cardeza, Carlos M., 2309 Sunset Blvd., Houston, Texas 77005. (Amateur.)
- Carley, T. S., 407 Kingston, Deerfield, Ill. 60015.
- Carney, W. Patrick, Dept. Biology, Minot State College, Minot, N. D. 58701.
- Carr, Mrs. Jack C., 916 S. Fell, Normal, Ill. 61761 (*Cypraea*; *Murex*; collecting).
- Carriker, Dr. M. R., Marine Biological Lab., Woods Hole, Mass. 02543. (Shell
demineralization; boring mechanisms of mollusks; marine ecology.)
- Casa Ybel Hotel and Beach Club, Sanibel Is., Fla. 33957.
- **Cate, Mr. and Mrs. Crawford N., 12719 San Vicente Blvd., Los Angeles, Calif.
90049. (*Mitra*, *Cypraea*; no exchanges.)
- **Chace, Mr. and Mrs. Emery P., 24205 Eshelman Ave., Lomita, Calif. 90717.
- Chandler, Carl and Doris, P.O. Box 621, Rt. 28, Chatham, Mass. 02633. (*Conus*,
Cypraea.)
- Chanley, Paul, Virginia Inst. of Marine Sci., Gloucester Pt., Va. 23062.
- Chatham Marine Shell Museum, Carl and Doris Chandler, Directors, P.O. Box 621,
Rt. 28, Chatham, Mass. 02633.
- Childs, Dinah M., 400 Maynard, Apt. 1002, Ann Arbor, Mich. 48108. (Cytology of
mollusks.)
- Clark, Mrs. Dorla, Sun Circle Resort, Orange Beach, Ala. 36561.
- Clark, Wm. F., Mark D. and Robert G., 504 Valley Rd., Terre Haute, Ind. 47803.
- Clarke, Dr. Arthur H., Jr., Dept. of Mollusks, Natl. Museum of Canada, Ottawa,
Ontario, Canada.
- Clarke, Dr. Rosemary, 2049 University Ave., Dubuque, Iowa 52002.
- Clench, Dr. Wm. J., Museum of Comp. Zool., Cambridge, Mass. 02138.
- Cleveland Museum of Nat. Hist., 10600 E. Blvd., Cleveland, Ohio 44106.
- Cloidt, Chas. J., 74 Manhattan Ave., Avenel, N. J. 07001. (Shells of New Guinea
and the Philippines.)
- *Coan, Eugene, 891 San Jude Ave., Palo Alto, Calif. 94306.
- Coley, Mrs. Gene, 2221 Bayview Rd., Punta Gorda, Fla. 33950.
- Compitello, Mrs. Juliette, 399 St. John's Place, Brooklyn, N. Y. 11238.
- Conde, Vincent, Redpath Museum, McGill Univ., Montreal, Quebec, Canada.
- Cooper, Robt. W. and Marjorie, 5012 Pfeiffer Rd., Peoria, Ill. 61607. (Florida ma-
rine shells; world *Murex*, *Pecten*, *Spondylus*.)
- Corbett, Wm. Phelps, 2939 Nelson St., Ft. Myers, Fla. 33901. (Exch. rare *Cypraea*,
Olivia, *Murex*.)
- Corey, Mrs. David S. K., 916 Airport Rd., Blacksburg, Va. 24060.
- Corgan, Jas. X., Box 7190, Tulsa, Okla. 74105. (Microscopic gastropods.)
- Cornell University Library, Research Dept., Ithaca, N. Y. 14850.
- Coullahan, Jas. W., Jr., 58 Paul Revere Rd., Groton, Conn. 06340.
- Cowles, Edw. F., Jr., 12 Hillcrest Ave., New Rochelle, N. Y. 10801. (Photography;
tropical marine shells.)
- Craine, Ruth A., 63 West Main St., Norwich, N. Y. 13815.
- *Craig, Mrs. G. E. G., Apdo. Postal 448, Guaymas, Sonora, Mexico.

- *Cramer, Frances L., 766 Obispo Ave., Long Beach, Calif. 90804. (Ecology; conservation.)
- *Crittenden, Mrs. John S., 624 Waterfall Isle, Alameda, Calif. 94501.
- Crocker, Mr. and Mrs. Arthur M., Laurel Hollow, Syosset, N. Y. 11791.
- Crum, Mrs. Dan, 2217 N. E. 2nd St., Apt. 3, Pompano Beach, Fla. 33062. (*Junonia*, also Philippine and Cuban land and tree snails.)
- Cull, Mrs. Robt. R., 7927 Chippewa Rd., Brecksville, Ohio 44141.
- Cummings, Raymond W., 37 Lynacres Blvd., Fayetteville, N. Y. 13066. (Shells of the West Indies, esp. Windward and Grenadine.)
- Cutler, Henry H., 105 Abbott Rd., Wellesley Hills, Mass. 01570.
- Cvancara, Dr. Alan Milton, Dept. Geology, U. of N. Dak., Grand Forks, N. Dak. (Recent freshwater mussels and Early Tertiary mollusks.)
- D'Amico, Jos. S., 119 Persimmon Lane, Lake Jackson, Texas 77566.
- D'Attilio, Mr. and Mrs. Anthony, 444 East 82 St., New York, N. Y. 10028.
- Danforth, Miss Louise L., Box 415, Vineyard Haven, Mass. 02568.
- Dater, Miss Carol, Ashfield, Mass. 01330.
- Davis, Derek S., Dept. Biology, Dalhousie Univ., Halifax, Nova Scotia, Canada. (Gastropod biology and taxonomy.)
- *Davis, Dr. Geo., Dept. Medical Zoology, 406 Med. Lab., U. S. Army Med. Comm., Japan. APO, San Francisco 96343.
- Davis, Mrs. Lawrence J., 20 W. 35th St., Wilmington, Del. 19802. (Amateur; all shells.)
- Dawley, Dr. Charlotte, The Woman's College, Univ. of N. C., Greensboro, N. C. 27412.
- Deatrick, Paul A., 33 N. W. 33rd Ave., Miami, Fla. 33101. (*Strombus*, *Busycon*.)
- DeLuca, Mrs. John A., Miss Gladys, Deborah Rd., Hanover, Mass. 02339.
- *Demond, Joan, Dept. Geology, Univ. of Calif., Los Angeles, Calif. 90024.
- Desmond, Hon. Thos., 94 Broadway, Newburgh, N. Y. 12550.
- Dexter, Dr. and Mrs. Ralph W., Dept. Biol. Sci., Kent State Univ., Kent, Ohio 44240.
- Dickenson, Jas. R., M.D., 250 E. State St., Westport, Conn. 06880. (General interest.)
- Dietrich, Mr. and Mrs. Louis E., 310 Veri Ave., Pittsburgh, Penn. 15220.
- Dixon, Mrs. Ruth S., 711 Parker St., Durham, N. C. 27701. (Marine mollusks.)
- Dodd, Wm. E., M.D., Ocean St. and Bay Ave., Beach Haven, N. J. 08008.
- Donohue, Prof. Jerry, Dept. Chemistry, Univ. of Penn., Philadelphia, Pa. 19104.
- Duerr, Dr. Frederick, 933 Valley View Dr., Vermillion, S. Dak. 57069.
- Dunbar, Edwin C., Zool. Dept., Univ. of S. Dak., Vermillion, S. D. 57069. (*Gonio-basis* sp.)
- Dundee, Dr. Dolores S., Dept. Biol., La. State Univ. in New Orleans, New Orleans, La. 70150. (Land mollusks; freshwater mussels.)
- Dunegan, Fr. Bertrand, O.S.B., James Barry-Robinson, 443 Kempville Rd., Norfolk, Va. 23502.
- Dunn, V. Roger, 5021 18th Ave., S., Gulfport, Fla. 33707. (*Conus*.)
- *DuShane, Mrs. Jos., 15012 El Soneto Dr., Whittier, Calif. 90603.
- Dvorak, Stanley J., 3856 W. 26th St., Chicago, Ill. 60623. (Muricidae.)
- Eckardt, Mary Jean, 35 Prospect Park West, Brooklyn, N. Y. 11215.
- Eddison, Grace G., M.D., 810 Soundview Dr., Mamoroneck, N. Y. 10543. (World marine.)
- *Edmiston, Mrs. J. R., 14359 Addison St., Apt. 311, Sherman Oaks, Calif. 91403.
- Ellis, Dr. Derek V., Dept. Biol., Victoria Univ., Victoria, B. C., Canada.

- *Emerson, David N., Dept. Biol. Science, Univ. of Alaska, College, Alaska 99701.
Emerson, Dr. William K., Museum of Nat. Hist., Central Park W. at 79th St., New York, N. Y. 10024.
- Emery, Adele K., Box 1265, South Miami, Fla. 33143. (Florida east coast shells.)
Erickson, Carl W., 4 Windsor Ave., Auburn, Mass. 01501.
Eubanks, Mrs. Edwin W., 3260 High Vista Dr., Dallas, Texas 75234
Exum, Mrs. J. C., Jr., Box 522, Snow Hill, North Carolina 28580
*Eyerdam, Walter J., 7531 19th Ave., N. E., Seattle, Wash. 98115.
- Fackert, Dorothy M., R. D. 1, Box 355, Sussex, N. J. 07461.
Fain, Dr. Chas. W., 1285 John Anderson Drive, Ormond Beach, Fla. 32074. (Caribbean bivalves.)
- *Fancher, Madeline J., Box 144, Bridge Rt., Myrtle Point, Ore. 97458. (Amateur.)
Farrell, Lyle H., Proctor Academy, Andover, N. H. 03216.
Farris, Dr. Vera King, Museum Zool., U. of Mich., Ann Arbor, Mich. 48104
Faulkinbury, R. P., 106 Pensacola Ave., Fairhope, Ala. 36532. (Small shells of north-west Florida and Alabama.)
Ferguson, Dr. and Mrs. John H., School of Med., Univ. of N. Car., Chapel Hill, N. Car. 27515.
Fetherston, Mr. and Mrs. Thos. C., 8 Nanticoke Rd., Cambridge, Md. 21613 (Self-collected American marine shells)
Finlay, C. John, 105 Tanglewood Lane, Nottingham Manor, Newark, Del. 19711. (West Indies marine.)
- *Fletcher, Howard L., 1008 La Hermosa Dr., Redlands, Calif. 92373.
Floyd, G. Thomas, 649 Blaine Ave., Akron, Ohio 44310.
Foehrenbach, Jack, 91 Elm St., Islip, L. I., N. Y. 11751. (Ecology of marine mollusks.)
Ford, E. Flynn, 2100 S. Ocean Dr., Apt. 8-M, Ft. Lauderdale, Fla. 33316.
Foster, Mrs. Fred, 401 N. Justus St., P.O. Box 213, Oxford, Ind. 47971
- *Franchini, Irene, P.O. Box 41, Tranquillity, Calif. 93668.
Franke, Norman W., 214 Orion St., Pittsburgh, Pa. 15235. (Self-collected marine shells.)
Franz, Dr. David R., Dept. Zool. and Entomology, U. of Conn., Storrs, Conn. 06268 (Ecology and physiology marine mollusks, esp. Nudibranchs)
Franzen, Dr. Dorothea, Ill. Wesleyan Univ., Bloomington, Ill. 61702.
Freeman, Mr. and Mrs. Harley L., 353 S. Atlantic Ave., Ormond Beach, Fla. 32074. (West Atlantic shells.)
- *French, Mrs. Ruth, 24213 Eshelman Ave., Lomita, Calif. 90717.
- Garcia, Emilio F., 135 Oak Crest Dr., Lafayette, La. 70501 (Bulimulinae, Pectinidae, Cypraeidae.)
Garoian, Dr. Geo., Dept. Zool., So. Ill. Univ., Carbondale, Ill. 62901.
Garrett, Mrs. Sharon V., 227 Winchester Dr., Hampton, Va. 23366
Gary, Dr. R. Thatcher, Mrs. R. Thatcher and Miss Albadelana, Box 234, Rt. 1, San Marcos, Texas 78666. (All shells, recent and fossil.)
Gause, Wanda Van Brunt, 3801 Alhambra Circle, Coral Gables, Fla. 33134. (Florida shells.)
Geological Survey of Canada Library, Room 350, 601 Booth St., Ottawa, Ontario, Canada.
Ghiselin, Dr. Michael T., Dept. Zool., Univ. of Calif., Berkeley, Calif. 94720.

- Gilbert, Mrs. Laura, 451 Hammond Ave., San Antonio, Texas 78210. (All shells.)
- Gillam, Elizabeth H., 7 Clifton Ave., Merchantville, N. J. 08109. (Amateur.)
- Gilmour, Thos. H. J., Dept. Biology, U. of Saskatchewan, Saskatoon, Saskatchewan, Canada (Anisomyarian bivalves)
- Goethel, Mrs. Louis, 9402 Nona Key Dr., San Antonio, Texas 78217.
- Golden, Jos., 3505 Chamberlayne Ave., Apt. J-1, Richmond, Va. 23227. (All shells.)
- Goldschmidt, Faith K., 302 S. 11th Ave., Highland Park, N. J. 08904. (World shells; exch.)
- *Good, Mrs. Barbara J., 3142 Larga Court, San Diego, Calif. 92110.
- Gordon, Henry S., 1 Washington Sq. Village 4F W., New York, N. Y. 10012.
- Graaf, Gerrit de, 10915 S. W. 55th St., Miami, Fla. 33165.
- Grabie, Mrs. A. J., Lot 22, 7803 46th Ave. N., St. Petersburg, Fla. 33700
- Graf, Jas. R., 3117 Grindon Ave., Baltimore, Md. 21214. (World shells.)
- Grantier, Mrs. Bruce, 20 Hobart Dr., Willowdale, Ontario, Canada. (Persian Gulf shells.)
- Graves, Howard B., Jr., 826 S. Ingraham, Lakeland, Fla. 33801. (*Conus*.)
- Green, Mrs. Warren B., 36 Sharp Hill Rd., Wilton, Conn. 06897 (General collecting)
- *Gregg, Wendell O., M.D., 2220 S. Harvard Blvd., Los Angeles, Calif. 90018.
- Griffith, Mrs. Lela M., Egmont, British Columbia, Canada. (British Columbia marine shells, also *Conus* and *Cypraea*.)
- Groeneveld, Miss Mae, 1183 Terrace St., Muskegon, Mich. 49442 (*Cypraea*, *Conus*)
- *Gross, James B., Box 185, Douglas, Alaska 99824 (N.E. Pacific mollusca)
- Gruetzmacher, Inez, 534 1st St., Menominee, Mich. 49858.
- Guckert, Richard H., 433 Grace Rd., Upper Darby, Penn. 19082
- *Gudnason, Mrs. Harold, 1959 Wrenn St., Oakland, Calif. 94602.
- Gugler, Carl W., Dept. Zool., Univ. of Neb., Lincoln, Neb. 68508. (Terrestrial pulmonates.)
- Gunter, Dr. Gordon, Gulf Coast Research Lab., Ocean Springs, Miss. 39564 (Ostreidae)
- Gurkow, Helen J., M.D., 195 E. Main St., Platteville, Wis. 53818.
- Gurwood, Dr. A. G., 298 N.W. 105th St., Miami, Fla. 33150
- Haas, Dr. Fritz, 7701 South Shore Dr., Chicago, Ill. 60649.
- Hadley, Mrs. Esther, 48 Adella Ave., West Newton, Mass. 02165
- Hall, Mrs. Warner L., 727 Queen's Rd., Charlotte, N. C. 28207.
- Hamilton, Mrs. Wm. J., 615 Highland Rd., Ithaca, N. Y. 14851.
- *Hand, Dr. Cadet H., Dept. Zool., Univ. of Calif., Berkeley, Calif. 94720.
- Hano Specimen Shells, 1598 Third Ave., New York, N. Y. 10028 (Rare shells)
- **Hanselman, Lt. Col. and Mrs. G. A., 5818 Tulane St., San Diego, Calif. 92122.
- Hansler, Dorothy E., 6431 17th Place N., St. Petersburg, Fla. 33710 (Showy shells)
- Harman, Willard N., 149 Stadium Pl., Syracuse, N.Y. 13200. (Freshwater mollusca.)
- Harris, Mrs. E. Milton, 3237 Carlisle Rd., Birmingham, Ala. 35213.
- Harrison, Mrs. F. F., One Beaver St., Cooperstown, N. Y. 13326.
- Harry, Dr. Harold W., 4612 Evergreen, Bellaire, Texas 77401.
- Heard, Dr. Wm., Dept. Biol. Sci., Fla. State Univ., Tallahassee, Fla. 32301. (Land and freshwater mollusks—ecology, etc.)
- Heck, Maj. Ralph L., Box 4561, Ft. Eustis, Va. 23604. (World gastropods, esp. *Conus*, *Cypraea*.)
- Heist, Mrs. Mattie V., 1633 Mt. Eagle Place, Alexandria, Va. 22302

- Hermann, Mrs. Pat, Dept. Entomology, Univ. of Georgia, Athens, Ga. 30601. (Land snails.)
- Herrington, Rev. H. B., Westbrook Heights, Westbrook, Ontario, Canada. (Sphaeriidae.)
- *Hertlein, Dr. Leo G., Calif. Academy of Sci., San Francisco, Calif. 94118.
- Hesse, Stanley H., 912 Drake St., Columbia, S. C. 29205. (Shells of Cape Hatteras, N. C.)
- Hettick, Mrs. G. Riley, 933 Lynwood Dr., Bartlesville, Okla. 74003.
- Hickman, Mrs. Harriette L., 11015 First Ave., Stone Harbor, N.J. 08247 (World-wide *Epitonium*.)
- Hicks, Mrs. Edwin S., 7170 Lucky Drive West, Jacksonville, Fla. 32208 (General collecting, also fossil shells)
- Higbee, Mrs. Florence and Joan, 13 N. Bedford St., Arlington, Va. 22201.
- *Hinshaw, Merton E., Bower Memorial Museum, 2000 N. Main St., Santa Ana, Calif. 92707.
- Hodgkinson, Stanley, P.O. Box 271, Victoria, B. C., Canada (World marine shells)
- *Hoffman, Al, 1010 Garden St., Santa Barbara, Calif. 93101.
- Holeman, John, 314 Terrace Rd., Schenectady, N. Y. 12306.
- Holle, Dr. Paul A., 7 Mars Dr., Shrewsbury, Mass. 01545. (Salt marsh snails.)
- Hollister, Dean S. C., 201 Hollister Hall, Cornell Univ., Ithaca, N. Y. 14850.
- Hornstein, Leon, 2211 Arden Rd., Baltimore, Md. 21209. (Amateur.)
- Houbrecht, Fr. Jos. R., 220 S. 56th Ave., Hollywood, Fla. 33023. (Zoogeography, systematics, evolution.)
- *Howard, Mrs. Faye B., 4167 Creciente Dr., Santa Barbara, Calif. 93105. (Gulf of California shells.)
- Hoyt, Murray, 8 Green Mountain Place, Middlebury, Vt. 05753 (Sanibel Is. shells)
- Huber, Julia M., Museum of Zool., U. of Mich., Ann Arbor, Mich. 48104.
- Hubricht, Leslie, 3235 23rd Ave., Meridian, Miss. 39303. (U. S. land and freshwater shells.)
- Huldrum, Mrs. M., Gordon Rd., Scarsdale, N. Y. 10583
- Hulswit, Mart, 680 West End Ave., New York, N. Y. 10025 (SCUBA collecting)
- *Humme, Mrs. June H., Box 56, Waipahu, Hawaii 96797. (Bivalves, also self-collected shells.)
- Hunkins, Mrs. Ruth E., Sweet Hill Rd., Plaistow, N. H. 03865. (Miniature shells; exch.)
- Hunter, Mrs. Anne, 126 Cedar Ave., Hackensack, N. J. 07601.
- *Hunter, Rev. Elwood, P.O. Box 203, Yachats, Ore. 97498.
- Hunter, Dr. W. D. Russell, Dept. of Zool., Syracuse Univ., Syracuse, N. Y. 13210.
- Imlay, Marc C., Nat. Water Quality Lab., 6201 Congdon Blvd., Duluth, Minn. 55804.
- Isom, Billy G., 3 Brockhaven Rd., Chattanooga, Tenn. 37404 (Freshwater mollusks.)
- Ives, Harlem B., 8401 W. Chicago Ave., Detroit, Mich. 48204.
- Jackson, Ralph W., Rt. 1, Cambridge, Md. 21613. (Exch. land shells.)
- Jacobs, George, 853 Riverside Dr., New York, N. Y. 10032. (Buy and exch. foreign land and marine shells.)
- Jacobson, Morris Karl, 455 Beach 139th St., Rockaway Beach, N. Y. 11694.
- Jame, Mrs. Frederic, 850 W. 52nd St., Kansas City, Mo. 64112.
- Javo Distributing Co., P.O. Box 13288, Tampa, Fla. 33611. (World shells for amateur collectors.)

- Jenner, Dr. Chas. E., Dept. Zool., Univ. of N. Carolina, Chapel Hill, N. C. 27514 (Ecology, freshwater and marine mollusks)
- Jennewein, Paul R., Box 394, Wrightsville Beach, N. C. 28480 (Raising mollusks in aquaria; writing and illustrating articles on shell collecting)
- Jensen, Mrs. Dorothy, 30-83 Crescent St., Apt. B-3, Astoria, N. Y. 11102.
- *Johnson, Col. and Mrs. Harvey R. (Ret.), 3915 S.W. 109th St., Seattle, Wash. 98146
- Johnson, Mrs. Kenneth L., 3206 Sussex Rd., Raleigh, N. C. 27607 (World marine shells)
- Johnson, Richard I., 124 Chestnut Hill Rd., Chestnut Hill, Mass. 02167. (Unionidae and books.)
- Johnstone, Mr. and Mrs. Harry I., 'Palmetto,' 2209 River Forest Dr., Mobile, Ala. 36605.
- Jones, Dr. David T., P.O. Box 1, Bourbonnais, Ill. 60914.
- Joy, Mr. and Mrs. Frederick van B., Van Beuren Rd., Morristown, N. J. 07960.
- Karre, Frederick H., Muscatine Community College, Muscatine, Iowa 52761 (Snail ecology).
- Katsaras, Nick, 479 B S. Washington Ave., Bergenfield, N. J. 07621.
- *Keen, Dr. A. Myra, Dept. Geol., Stanford Univ., Stanford, Calif. 94305.
- Keferl, Eugene P., 4766 Riverside Ave., Columbus, Ohio 43321. (Terrestrial gastropods.)
- Kemper, Mrs. Hessie, 11854 Josse Dr., St. Louis, Mo. 63128
- *Kenk, Dr. Vida, 1035 Meridian Ave., Apt. 30, San Jose, Calif. 95125.
- Kennedy, Mr. and Mrs. Douglas and Caroline, 1071 Northampton St., Holyoke, Mass. 01040.
- Kettell, Rev. and Mrs. A. B., RFD 1, Unionville, Conn. 06085. (Private collection.)
- *Kile, Chas. O., Box 2046, Agana, Guam 96910. (All shells.)
- *King, David Shaw, 200 Golden Gate Ave., Belvedere, Calif. 94920. (Caribbean gastropods.)
- Kingston, Harry Lea, 1670 Fairway Dr., Beaumont, Texas 77703 (Exchange and buy world shells.)
- Kline, Mr. and Mrs. Geo. F., 353 Shunpike Rd., Madison, N. J. 07940.
- Knauer, Mrs. Freda S., 10318F Malcolm Circle, Briarcliff Village, Cockeysville, Md. 21030. (Marine collecting; exch.)
- *Kohn, Dr. Alan J., Dept. Zool., Univ. of Washington, Seattle, Wash. 98105.
- *Kondo, Dr. Yoshio, Bernice Bishop Museum, Honolulu, Hawaii 96819.
- Kraemer, Mrs. Louise R., Dept. Zoology, Univ. of Arkansas, Fayetteville, Ark. 72702. (Freshwater lamellibranchs.)
- Krause, John A., 44 Ridge St., Manchester, Conn. 06040 (Scaphopods)
- *Krauss, N. L. H., 2437 Parker Place, Honolulu, Hawaii 96822. (Carnivorous land snails; biology.)
- Kregear, Rodney D., 18282 Delaware, Detroit, Mich. 48240. (Cypraeidae, also freshwater shells of the Great Lakes.)
- Kreisman, Don, 1439 Nixon, University City, Mo. 63130. (Freshwater mollusca.)
- Kuchar, Mr. and Mrs. Jos. J., 11 Franklin Ave., Montvale, N. J. 07645.
- Kuczynski, Florence, 7400 46th Ave. N., Lot 406, St. Petersburg, Fla. 33709 (Collect, photograph and exchange shells)
- Kurz, Richard M., 1575 N. 118 St., Wauwatosa, Wisc. 53226. (Large specimen shells.)
- LaLonde, Mary, 727 Calvert St., Rome, N. Y. 13440. (All shells.)
- Lamberts, Dr. Austin, 1520 Leffingwell, N. E., Grand Rapids, Mich. 49505.

- *Landye, Jas. Jerry, Lab. of Anthropology, Washington State Univ., Pullman, Wash. 99163. (Freshwater mollusca.)
- *Lange, Dr. W. Harry, Div. of Entomology, U. of Cal., Davis, Calif. 95616.
- *La Rivers, Dr. Ira, Biol. Society of Nevada, P.O. Box 8096 Univ. Sta., Reno, Nev. 89507.
- LaRocque, Dr. Aurèle, Dept. Geol., Ohio State Univ., 125 S. Oval Dr., Columbus, Ohio 43210.
- **Larson, Douglas A. and Mary R., P.O. Box 338, Cambria, Calif. 93428 (Amateurs)
- Lawler, David, 680 Queen St., Bridgeport, Conn. 06606. (*Cypraea*.)
- Lawrence, Mrs. Kay, 88 Siders Pond Rd., Falmouth, Mass. 02540. (Pectinidae.)
- Lawrence, Van L., M.D., Macgregor Medical Clinic, 6303 South Park Blvd., Houston, Texas 77021.
- Lawson, Arthur and Selma, 2600 Pass-a-Grille Way, Box 46722, Pass-a-Grille, Fla. 33741.
- Lemire, Ross, 184 Grandview Ave., Willowdale, Ontario, Canada.
- Lencher, Judge and Mrs. Benj, Apt. 408, 144 N. Dithridge St., Pittsburgh, Penn. 15213.
- Lewis, Harold, 125 McClenaghan Mill Rd., Wynnewood, Penn. 19096.
- Lewis, Dr. and Mrs. John R., 1065 Norbury Ave., Lombard, Ill. 60148. (*Murex*.)
- Lewis, Mrs. J. Kenneth, 9207 48th Ave., College Park, Md. 20741.
- Lewis, Mr. and Mrs. Kenneth R., 1705 Pelican Dr., Merritt Is., Fla. 32952.
- Light, Frank B., Jr., 4210 Randolph Rd., Charlotte, N. C. 28211.
- Lindar, Albert J., 5124 Cornell Ave., Chicago, Ill. 60615.
- Lindsay, Gene K., Div. of Mollusks, University Museums, U. of Mich., Ann Arbor, Mich. 48104
- Lo, Chin-tsong, Dept. Zool., University Museums, U. of Mich., Ann Arbor, Mich. 48104
- Loizeaux, Margaret Ann, U. S. Naval Dental Clinic, Box 64, FPO, N. Y. 09593
- *Long, Mary E., 36 W. Lytton St., Sonora, Calif. 95370. (Marine shells.)
- **Loosanoff, Dr. and Mrs. Victor, 17 Los Cerros Dr., Greenbrae, Calif. 94904.
- Lowry, Walter G. and Nelle H., 5404 Overlook Dr., Rt. 1, Raleigh, N. C. 27609.
- Lubinsky, Dr. Irene, Dept. Zoology, Univ. of Manitoba, Winnipeg, Manitoba, Canada. (Marine bivalves of the Canadian Arctic.)
- Luehm, Mrs. Edith P., 3000 Versailles Ave., McKeesport, Pa. 15132. (*Cymatium*; seascapes.)
- Luttrell, Mr. and Mrs. A. L., Wall Lane and Old Georgetown Rd., Rockville, Md. 20852. (Marines and fossils.)
- MacBride, Grace, R.D. 1, Hartman Rd., North Wales, Penn. 19454.
- MacLeod, Dr. Malcolm L., 14201 N. W. 17th Ave., Miami, Fla. 33168.
- MacMillan, Gordon K., 169 Glenfield Dr., Pittsburgh, Penn. 15235.
- Macpherson, Dr. and Mrs. A. H., 258 Powell Ave., Ottawa, Ontario, Canada. (Canadian gastropods; taxonomy.)
- Maes, Virginia Orr, Dept. Mollusks, Academy Nat. Sci., Philadelphia 19103.
- Malick, Donald, 5514 Plymouth Rd., Baltimore, Md. 21214. (Fossils—buy, sell, exch.)
- Malone, Elsie, Sanibel Island, Fla. 33957. (Buy, sell, exch. world shells.)
- Manes, Mrs. Sidney, Knollwood Rd., Fayetteville, N. Y. 13066 (*Haliotis*; also land and fw species)
- Marsh, Mrs. Therese C., P.O. Box 22291, Ft. Lauderdale, Fla. 33315. (S. E. Florida marine; world bivalves.)

- *Marshall, Mrs. Thos. H., 2237 N. E. 175th St., Seattle, Wash. 98155. (World shells; exch.)
- Mattera, Albert and Mrs. Emily, 4501 Traymore, Bethesda, Md. 20014. (*Murex*.)
- Matteson, Dr. Max R., Dept. Zool., Univ. of Ill., Urbana, Ill. 61803.
- Mauseth, E. L., Alden, Minn. 56009. (All shells.)
- McCallum, John and Gladys, Meadowvue Drive, Rt. 2, Wexford, Penn. 15090
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- Lucas, Maurice, Director Les Naturalistes Belges, 10 Avenue des Mantes, Brussels 17, Belgium.
- Malacological Society of Australia, Australian Museum, College St., Sydney, NSW, Australia.
- Malacological Society of Australia, 351 Glenferrie Rd., Malverne, Melbourne, Australia.
- Malek, Dr. Emile A., Div. of Communicable Diseases, WHO, Ave. Appia, Geneva, Switzerland.
- Matthews, Henry R., P.O. Box 663, Fortaleza, Ceará, Brazil.
- Ministry of Agriculture Fisheries Lab., Burnham-on-Crouch, Essex, England. (Oysters and their pests; *Buccinum*; *Mytilus*; *Cardium*.)
- Miyauti, Tetuo, Katsuiso-Zyutaku 37, Katsumi-cho 200, Sasebo, Nagasaki, Japan (Pearl oysters and pearls)
- National Lending Library for Science and Technology, Accessions Dept., Boston Spa, Yorkshire, England.
- National Museum of Victoria, Russell St., Melbourne, Australia.

Netherlands Malacological Society, c/o Zool. Museum, Plantage Middenlaan 53, Amsterdam, Netherlands.

Oyama, Dr. Katura, Geol. Survey of Japan, Kawada-cho 8, P.O. Ushigome, Tokyo, Japan.

Pantebre, J., 63 Fitzroy St., St. Kilda, Victoria, Australia (All shells; exch.)

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Valero, Mme. Denise F. and M. F., 13 Rue Molière, Nice, France (Conidae)

Warners, Jeanne A. W., Vledderweg 25, Frederiksoord, Vledder, Holland.

Wooton, Mrs. Mary Agnes, 7 Buena Vista Pl., Kingston, Jamaica.

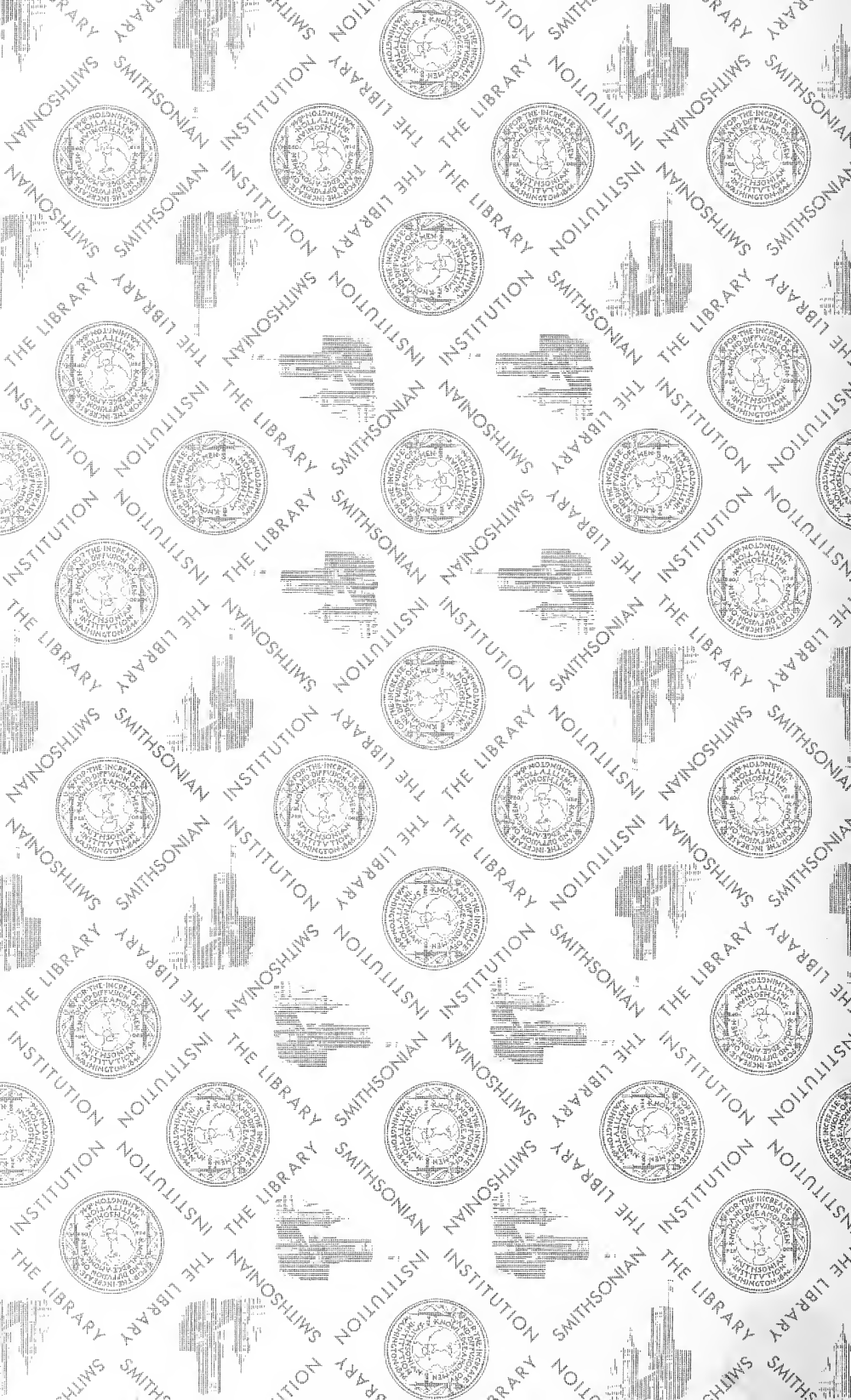
Wrigley, Rev. G. K., The Muschett House, c/o Duncans P. O., Jamaica.

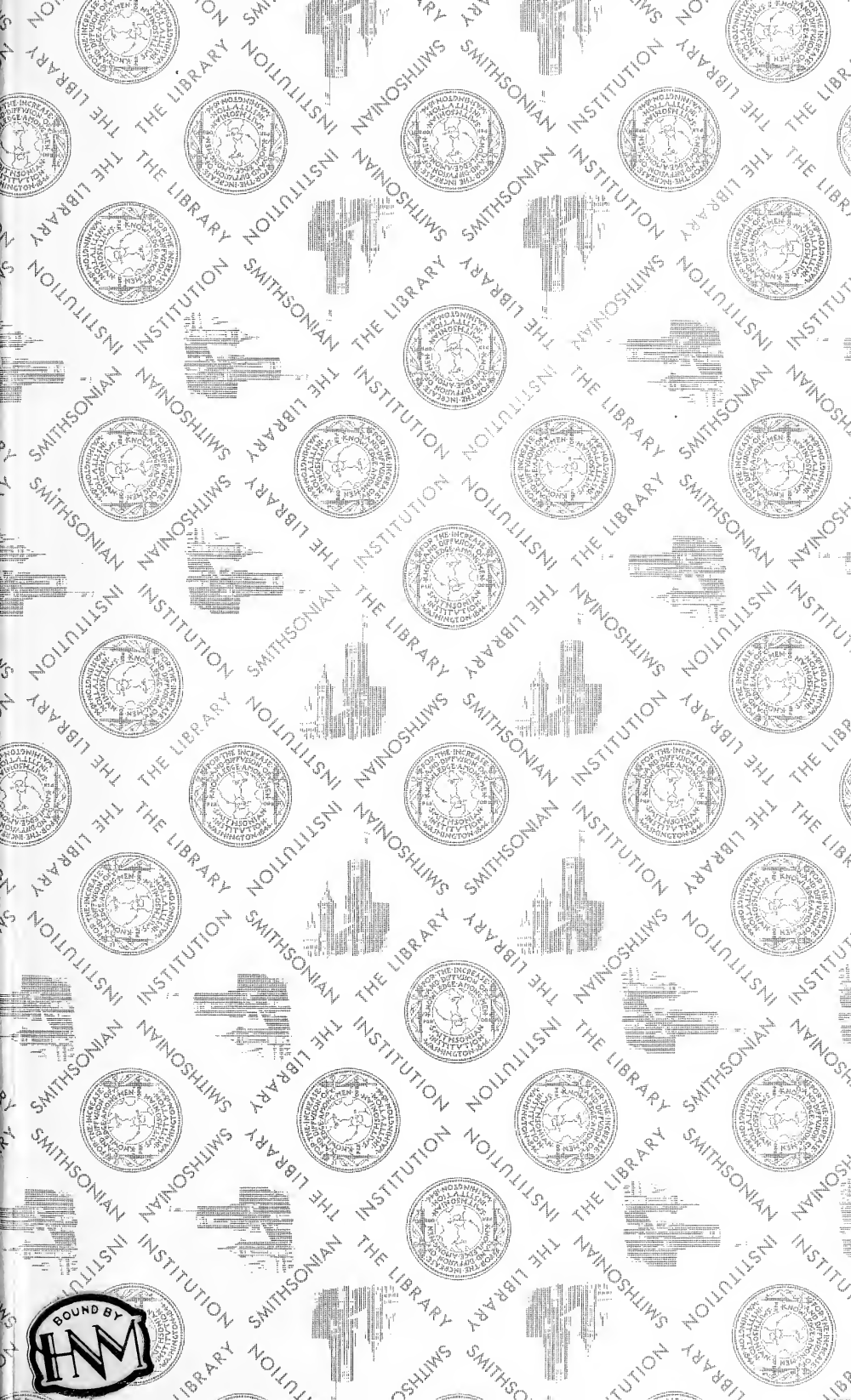
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